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Automation—Some Social Aspects

by

H. DE BIVORT

International Labour Office

Since the advent of automation many questions have been raised concerning its possible repercussions on labour.[1] *These questions, which are of wide interest, since numerous applications of automation in industry and commerce have already been reported from a great many countries, are discussed in the following article.*

The author first explains the meaning attached to the term "automation" and discusses the problems raised by automation in the light of the experience of countries in which it has begun to develop. Much of the documentation on which the article is based comes from the United States, where the major developments have taken place.

AMONG the ideas that have gained popular currency since the war few have given rise to such conflicting opinions as "automation".

Some hail it as the main hope for the increased productivity on which the future growth of national income must depend and forecast a rising income for everyone and more leisure time as well. Others fear its implications, for to them automation means the widespread displacement of people from their present jobs, with a resulting unemployment problem of catastrophic proportions. These conflicting attitudes are hardly surprising, for the implications of automation are uncertain, but there exists a widespread awareness that the world has entered on a new phase of technological development that is bound to affect the economy of nearly every country.

The active preoccupation in business and industry, trade union circles and university research centres in the more industrially developed countries with the changes that are becoming

[1] For a discussion of similar questions concerning the social implications of the industrial use of atomic energy, see *International Labour Review*, Vol. LXXII, No. 1, July 1955.

daily more evident in ever wider sectors of industry and commerce has spilled over into the public press, where periodicals and the daily papers report current developments and future prospects, frequently in sensational terms.

Even qualified commentators tend to describe automation as " a second industrial revolution ". They argue that, while the first industrial revolution replaced manual labour by machines, the second will replace manual control by machine control ; this new industrial revolution, they say, will turn over to instruments tasks that formerly had to be performed by men's hands and minds ; and they conclude that men will be eliminated from the industrial process or, on the contrary, that men will gain new stature, and work will become a more " human " activity, since it will require higher levels of skill ; the new tasks will make larger claims on man's unique abilities with which the machine cannot compete ; knowledge, judgment, responsibility in supervising more complex mechanical operations and processes will replace the dull, routine duties typical of so many industrial and office jobs of today.

Other equally competent observers both in management and in trade unions insist that the complex developments in industry to which the term " automation " is applied do not constitute a revolution, but represent the continuation of a long-term trend, which had its inception when James Watt developed the governor for his steam engine. Since then, they argue, as one element in an almost constant stream of technological advances automatic controls and devices have been developed and applied in an ever more complex form and to an ever wider range of industrial operations.

Whatever may prove to be the case, there is general agreement that automation raises vast problems for modern industrial society, even while it holds the promise, if its development can be wisely guided, of higher standards of living and leisure time for all.

It is important to recognise at the outset that automation cannot be considered in isolation. Its future is closely bound up with that of nuclear energy and its manifold applications in research and industry, such as the use of radio-active isotopes in measuring and controlling a multitude of industrial processes—the very development of atomic reaction was dependent on certain techniques of automation.[1] It will also affect, and in turn be affected

[1] It is well known, for instance, that the need to protect workers from the effects of radiation requires the shielding of all processes involving atomic reactions behind great thicknesses of lead and concrete and the use of other protective devices, which completely isolate the attendants from the operations they control. The accurate control of these lethal processes through remotely operated devices is only possible by the use of equipment that is at the very heart of automation.

by, the important transformations taking place in management's conception of its functions and of its relationship with the various factors of production.

In consequence, it is important that every member of society (since everyone will be affected in some way), and especially the industrial community most directly concerned with these developments, should gain a sound understanding of what automation really means. In particular, industrial and trade union leaders and governments will need to show flexibility in their approach to the problems involved if the present generation is to avoid the social mistakes of the Industrial Revolution and is to make the best use of the opportunities for change that automation will create.

What is Automation ?

The word " automation " is reported to have been conceived independently and at about the same time by John Diebold, then a student at the Harvard Graduate School of Business Administration [1], and Dell Harder, vice-president in charge of manufacturing of the Ford Motor Company.

Harder may have been the first to use the word in 1947 in describing improved methods for handling parts in process without the delays involved in manual operation.[2] In contrast to this conception of automation, which lays stress on reducing the costly idle time between machining operations on high-speed production tools resulting from the manual handling of each part into and out of the machine, Diebold has emphasised from the outset the view, shared by many, that automation represents a new way of thinking about the total process of production : that it denotes both automatic operation and the process of making operations automatic, with a resultant emphasis on self-regulation of the entire production process.

Although the term automation has come to mean many diff-

[1] Diebold led a research team in developing the theoretical background of automation and in working out a model for the automatic production of automobile pistons. See Harvard University, Graduate School of Business Administration : *Making the Automatic Factory a Reality*... Prepared under the leadership of John T. Diebold (Harvard, 1951).

[2] Harder has more recently expanded this definition, stating that in his view automation was in fact " a philosophy of manufacturing " and that its meaning should be broadened to include design of parts, methods for their manufacture and production-tool control systems. Another engineer has defined it as "... the art of applying mechanical devices to manipulate work pieces into and out of equipment, turn parts between operations, remove scrap, and to perform these tasks in timed sequence with the production equipment so that the line can be wholly or partially under push-button control at strategic stations " (quoted by Ashburn Anderson in *The Developments of Automation in Metal-Working*, Paper No. 55-SA-62 (New York, American Society of Mechanical Engineers, May 1955)).

erent things in various quarters, it should not be regarded simply as a synonym for technological change. Thousands of technological advances are constantly being made in industry that have nothing to do with automation. While it may be easiest to describe automation in terms of a family of different technological developments, it is not solely a technological phenomenon.

Automation is a particular kind of development combining a number of well-established engineering principles and certain recently developed theories of communication [1], which had their beginnings during the Second World War under the pressure of the urgent need to develop automatic and self-correcting devices such as those used on radar-guided aircraft, electronically controlled anti-aircraft guns, etc. In contrast to most forms of technological change—such as the development of automatic bottle-blowing machines or coal-cutting machinery, which are specific to a single industry—its principal characteristic is that it represents a generalised form of thinking about technological processes, one potentially applicable over a wide range of manual and clerical operations in a great many industries.

In practical application three basic forms of automation are generally recognised.

Integration

The first type is usually referred to by technicians as " integration " or " advanced mechanisation ", and the ideas leading to its development reflect the thinking of specialists in the metal-working industries, where this form of automation has made a fairly recent and spectacular entry. It is also often referred to as " Detroit automation ", since some of its most publicised applications have been made in the automobile industry in the United States. This type of automation consists essentially of linking together conventionally separate manufacturing operations into lines of continuous production, through which the product moves " untouched by human hands ". It is largely the outcome of mechanical engi-

[1] Specialists in many scientific and technical disciplines—physicists, psychologists, physiologists, mathematicians, statisticians, engineers and others—working together on a great variety of inter-related problems of communication, of transmitting, receiving and interpreting " messages ", of the use of " information " and its mathematical expression, experienced the need for a common technical language. This area of research and development was named " cybernetics " (from the Greek word for steersman, in the sense of to govern or to control) by Norbert Wiener, a professor of mathematics at the Massachusetts Institute of Technology and one of the principal architects of the new theory. The term is intended to cover the general theory of control and communication systems applied both to living organisms and to mechanical systems ; one of its basic elements is the concept of self-regulation, the engineering term for which is " feed-back " or " closed-loop circuit ".

neering thinking and represents the ingenious application of well-established mechanical methods for loading, unloading, transporting and positioning identical parts through a series of separate but closely integrated machine tools.

The process of developing this type of operation and the thinking that went into it are vividly described by R. H. Sullivan, another vice-president of the Ford Motor Company:

> . . . I don't mean that our factories had no automatic machines. In one sense we were too automatic—we had *too many unrelated machines*. We found, for example, that it was fast becoming impossible to utilise the full capacity of up-to-date machine tools, because *men couldn't load and unload them fast enough by hand*. The trouble with our manufacturing methods was that, like Topsy, they " just grew ", and nobody had taken time out for a long view. What we needed was a complete rethinking of the problem—*a whole new philosophy of manufacturing* .... In place of the old, complicated maze of machinery, we visualised long, clean production lines along which our *parts and materials would flow evenly and smoothly*—just as fast as modern machine tools could handle them. The processes of automatic lubrication, scrap removal and, to some extent, quality testing would be integrated into the lines. The new lines would be equipped with various control devices to assure effective preventive maintenance. The achievement of that dream over the span of a few short years involved a lot of work and headaches . . . we had to fit together the products of dozens of different manufacturers into a smooth-running system. The result was what has come to be called Automation.[1]

It is clear that this form of automation is, in fact, the latest step in a long chain of inventions and improvements in existing production methods. The earliest example of automatic machinery is probably the mechanical loom for weaving figured patterns in silk textiles, constructed in 1741 by a French inventor, Jacques de Vaucanson, the pedals of which were automatically controlled by means of a drum pierced with holes. Some 60 years later Joseph Jacquard improved on this device, perfecting the loom which bears his name and whose operations are controlled by a punched paper roll. In the United States, Oliver Evans in 1782 built a continuous-process flour mill, using an ingenious combination of belt conveyors, screw conveyors and endless chain buckets, that required no human labour from the time the grain was unloaded from the wagon until the flour was run into barrels ready for shipment. Many other developments in manufacturing processes, such as the constant refining of the accuracy of metal-working machines, the improvement in standards of measurement, the notion of the assembly line (as developed by Henry Ford in 1913), the transfer machine (of which an early example was built at the Morris automobile plant in Coventry (England) in 1924), had to be perfected before integration in its present form could be achieved.

[1] *Automation* (New York), Vol. 2, No. 10, Oct. 1955, p. 4.

Even the key principle of integration—continuous automatic operation or "flow production"—has been a characteristic for many years of industries handling liquids, gases or powdered goods, such as the oil and chemical industries. The important step, however, was to apply this principle to the manufacture of the hard and heavy components and products of the engineering industries and to the manufacturing operations of other industries whose products are solid, identical units, and which had all until then used, and mostly still use, the intermittent or "batch" process of production.

Feed-back Control

The principle on which the second form of automation is based is not new either. Briefly, the principle is that while a mechanism is working information is "fed back" to it, so that any divergence from the desired performance of the mechanism is automatically corrected.

The flyball governor invented by Watt to regulate the speed of his steam engine is generally regarded as the first example of true feed-back control. The governor consisted of two independent balls each hanging freely from one end of a short rod, the two rods being connected at their other ends to a collar, which was free to slide along a vertical shaft while being rotated by the shaft's motion. The shaft was driven by the engine, and its speed varied in consequence with that of the engine. As the engine speeded up, the balls would tend to fly apart and upward, while any slowing of the engine would permit the balls to swing inward and downward. This motion of the balls was in turn transmitted to a link mechanism, which controlled the throttle valve of the main steam intake of the engine. As the balls went higher the valve closed and the engine slowed down. As they dropped below their normal position the throttle valve was opened and the engine speeded up. The operator of the engine had then merely to set the governor so that when it reached a certain number of revolutions per minute the throttle valve would tend to close, thus reducing the volume of steam admitted to the engine, and the machine would maintain a more or less uniform speed automatically.

Another well-known form of a feed-back system, which more nearly corresponds to the complex forms applied in industrial production, is the thermostatic control in the hot air or hot water heating systems in many homes. This is a relatively simple self-correcting device which, through a mechanical contrivance, opens and closes an electrical circuit powerful enough to operate the control valve on the heating unit, which is thus able to maintain

a desired condition—the temperature of the room—fairly close to the desired average.

In most modern industrial applications, however, the system is considerably more complex and provides a much more refined and accurate control of the operation. The essential aspect of this type of control, however, is the same : it functions by comparing actual with expected performance. That is, the particular automatic mechanism is equipped with an electric device that compares the way in which the work is being done with the way in which it is intended to be done ; using electronic circuits to amplify the minute original currents sent out by the directing mechanism (signals), the device can automatically make any necessary adjustments in the work process through another device that is operated by the amplified current, the latter being powerful enough to open and close switches on the motors that control the working parts of the mechanism or other parts of the production process. These controls are called " servomechanisms ". They may be operated by electricity or by hydraulic power or compressed air and may be said to function as a type of governor. These controls have been highly developed in the chemical and oil-refining industries to open and close the thousands of valves and operate the multitude of other mechanisms involved in these industrial processes. In contrast to the first form of automation, which embodies predominantly mechanical engineering thinking, this form of control depends primarily on electrical engineering knowledge and techniques.

Computer Technology

The third form of automation involves another application of the generalised type of mathematical and engineering thinking about communication and control referred to earlier. This is the computer. A computer is an electronically operated machine capable of recording and listing information (generally in the form of numbers) and of performing both simple and complex operations on the basis of this information. Various types are now being produced. Some operate by comparing dimensions, such as lengths, weights or other quantities, and are called analogue (or analogy) computers ; others operate with figures or digits and are called digital computers. Computers are capable of solving highly complicated problems of the kind that arise particularly in research work. A whole range of special computers of more limited capacity are being produced for use in industry and offices. This type of automation is generally referred to as " computer technology ".

Even computer technology did not spring full-fledged from war-stimulated developments—although it is stated that some

nuclear fission and guided missile developments might have been well-nigh impossible without the use of the electronic computer. As early as the mid-1600s Blaise Pascal had built some half-dozen " arithmetic machines ", and other forms of computer appeared in the 1700s. A much closer approximation to the modern computer is the machine developed in 1823 by the English mathematician Charles Babbage, who was prevented from building his calculator by technical difficulties, including the inferior machining methods of the time. More than 50 years ago electrical calculators, keyboard and card-punching machines had begun to eliminate routine computations in research and office work. In the late 1920s, a group of United States scientists developed a differential analyser, which was the first of the large-scale computing machines. Recent developments in electrical and electronic engineering have given a tremendous impulse to the maturing of computer technology.

The extraordinary performance of computers in solving various complex mathematical problems has led many people to speak of electronic " brains " and to refer to their operation as " thinking ". Computers can and do, in fact, perform operations so complicated and tedious as to be beyond human patience to carry out, but they function only in so far as they have been given suitable " instructions " to deal with every problem or " original situation " that may arise in the course of their computations. Should an unforeseen problem occur, the machine, being without instructions as to how to handle it, will stop. This brings out the basic limitation of the computer—its capacity to perform operations only on instruction—and emphasises the basic difference between the computer's action and man's ability to reason, to think through original problems, to deal on the spot with unexpected situations and to make value judgments.[1]

Nevertheless these machines have already proved of great value in solving difficult mathematical problems presented by scientific

[1] The abilities and limitations of computers are summarised as follows in a recent engineering analysis of developments in the field of electronic computing :

" Computers *can (a)* learn what you tell them ; *(b)* apply the instructions when needed ; *(c)* read and remember numbers ; *(d)* add, subtract, multiply, divide and round off numbers ; *(e)* look up numbers in tables ; *(f)* look at a result and make a choice ; *(g)* do long chains of these operations one after another ; *(h)* write out an answer ; *(i)* make sure the answer is right ; *(j)* know that one problem is finished and turn to another ; *(k)* determine *most* of their own instructions ; *(l)* work unattended.

" On the other hand, computers *cannot (a)* think intuitively ; *(b)* make bright guesses and leap to conclusions ; *(c)* determine *all* their own instructions ; *(d)* perceive and interpret complex situations outside themselves." (*Electronics and Everyman*, Urwick, Orr and Partners, Ltd., London, 1955, p. 7.)

and engineering research, and their usefulness in other fields is being constantly demonstrated, such as their ability to handle numerous routine office operations performed by banks, insurance companies, pay-roll departments and the like.

Some Examples

These three types of automation, alone or in combination, have made possible a growing number of startling applications in a wide variety of industries and in nearly every industrialised country.

Some of the most notable applications of integration may be found in the newer automobile plants. In the Cleveland Engine Plant of the Ford Motor Company, one of the many interesting engineering features is the extensive and ingenious use of various automatic conveyor systems, which move the work from station to station through highly complex combinations of standard machine tools, called transfer machines, or from machine to machine, and which load and unload the parts in process without human intervention. For example, in one part of the engine block line, 25 men now perform the work formerly done by 117 men, principally because the present group of operators no longer have to stand before each machine and accurately position the work before the cutting tools can perform their task. Another combination of machine tools, tended by nine men, drills the necessary holes in the crankshaft, whereas this was formerly done by 39 men working on 29 separate machines. Although electronic equipment is extensively used in a wide variety of automatic controls, for instance to time the sequence of operations, few of the production machines in this plant employ the feed-back principle in their operation. Instead they are " programmed " to perform a predetermined sequence of operations a certain number of times (determined chiefly by tool wear). At the end of this time a man must still come and change the tool ; but no man need watch the machine while it operates.

Similar applications have been made and new developments announced by other automobile manufacturers in the United States and other countries. The machining of automobile parts in the Ford and Volkswagen plant in the Federal Republic of Germany is being turned over to automated production lines. The Renault works in France have for 12 years made increasing use of transfer machines for a wide variety of machining operations in the production of automobile components. The U.S.S.R. is reported to have a factory in which nine men per shift produce 3,500 piston

heads a day, enough for the entire Soviet light car industry.[1] In the United Kingdom a recent announcement concerning the Standard Motor Company's plans to modernise their tooling for the production of motor vehicles and tractors describes the performance of an electro-hydraulic transfer miller capable of performing electrically all six machining operations on a cylinder head. This machine, manufactured by the Heller Company in Germany, will give a much higher output with the direct labour of only two men—a loader (unloading is automatic) and a supervisor—than 22 men now achieve with conventional machine tools. Four other men will be required—electricians, maintenance men and tool setters, with a final saving of about 16 men. Another automatic device used by the Standard Motor Company is an inter-connected line, 80 yards long, of three Archdale " Unimatic " machines served by six men (one to load and one to unload each machine). The plant produces 21 finished cylinder blocks an hour, which pass automatically through 53 stations. The machines do all the drilling, tapping, rough-boring and counter-boring on all the faces of the cylinder block. This operation on conventional machines required 36 men for the production of 16 cylinder blocks an hour.[2]

Automatic operations of this type have many possible applications in the mass production industries, and it seems probable that it will be this type of automation that will make the most marked impact on manufacturing methods within the next few years. Its greatest limitations are the relative inflexibility and high first cost of the installations; its application is therefore only economically justified where long runs of identical products with little or no change in design are normal.[3]

Equally remarkable performances are reported from many other industries. To take only one example, electrical circuits for the radio industry are now " printed " instead of being laboriously assembled by soldering individual wires and other components. The printed circuit eliminates any chance of faulty connections, and the assembly of components is greatly speeded up. One case has been cited of a unit that assembles in little more than a minute the same number of multiple-part electronic units that a worker assembles in a full day. It requires only two workers and a super-

[1] See " Towards the Automatic Factory ", in *Planning* (London, P.E.P.), Vol. 21, No. 380, 13 June 1955, p. 71.

[2] *The Times*, 22 June 1955.

[3] A United States technical journal has stated that, in contrast to traditional type metal-working plants, where the cost of machinery and equipment per worker averages $9,200, the Ford Cleveland plant costs $28,750 per worker. See " Spot News of Metal Working ", in *American Machinist*, 14 Sep. 1955, p. 105.

visor, and has a capacity of more than 200,000 assemblies a month.[1]

Some of the most remarkable adaptations to almost fully automatic operation have been made in the last 20 years, with little notice in the general press, by the oil and chemical industries. Oil experts claim that a modern refinery is at present 80 to 90 per cent. automatic. In one of the latest refineries constructed, the Esso Petroleum Company plant at Fawley (England), six men on any one shift operate distillation units processing 5½ million gallons of crude oil a day. The through-put of this half-dozen men is enough (in weight) to meet nearly one-third of Britain's inland consumption of oil products. At the catalytic cracking plant only eight men are needed for each shift.[2] The plant employs nearly twice as many maintenance engineers as operators. Control of operations in a plant of this type involves the processing of the raw materials by regulating four variables—flow, temperature, pressure and level—and automation means the automatic control by instruments of these variables. Almost every instrument in the control room of a modern refinery provides both communication and control on the feed-back principle.[3]

In another field, the transformation of metals by machining, a number of successful attempts have been made to build fully automatic machine tools that perform their work on the basis of " instructions " fed into electronic equipment, which ensures the correct performance of the machine. An example of this type of application is the numerically controlled milling machine developed at the Servomechanisms Laboratory of the Massachusetts Institute of Technology. This is a standard type of milling machine whose normal controls have been replaced by servomotors, which drive the vertical and horizontal motions of the rotating head of the machine and the motion of the table holding the workpiece. The servomotors are in turn controlled through a series of electronic devices. The machine is able to cut out irregularly shaped metal parts by following instructions " programmed " into it by means of holes punched into a paper tape. The punching of the holes is done by another machine, which " codes " the holes in such a way that they can be " read " by a special type of computer called a director; this instrument in turn guides the milling machine through its intricate motions by means of electronic signals sent out to the servomotors. A separate feed-back system built into

[1] See James B. CAREY : " Labor's Stake ", in *The Challenge of Automation*, Papers delivered at the National C.I.O. Conference on Automation (Washington, D.C., Public Affairs Press, 1955), p. 64.

[2] *Planning*, loc. cit., p. 69.

[3] Ibid., p. 70.

the machine ensures that its every motion corresponds exactly to the original programme.

A somewhat different type of machine tool has been reported under development by the General Electric Company. In this the first part is produced in the traditional method by a skilled operator who guides the tool over the workpiece. Every motion of the machine is recorded on a tape and this tape, after any necessary corrections have been made on it—simply by cutting out any unnecessary or undesired motions and splicing the tape—can be used repeatedly as a master control to run the machine automatically in the production of any number of additional pieces. This type of operation is called " record-playback " control.

The transformation of a standard machine tool to this type of fully automatic operation naturally increases its cost several times. However, tests at the Massachusetts Institute of Technology on the electronically controlled milling machine have shown that intricate metal parts such as aircraft fittings produced by this method can be substantially cheaper—how much cheaper depends on the number of parts to be produced—than the same parts produced by conventional methods. Engineers foresee the day when simpler types of control will make such machines practicable for the smaller firm operating normally on short runs of identical parts. It is this type of automation that appears to open up the greatest opportunities to all types of firm, both large and small.

However, automation may well make its largest contribution in the routine handling of information in offices. Repetitive office work in sufficient bulk, such as calculations for pay-rolls, inventories, cost control and budgetary analysis, dividend and interest payments, tax deductions and the preparation of customers' bills can be put at least on a partially automatic basis through computers and a variety of specialised office equipment, much of which represents adaptations of equipment at present in use. A number of cases of such applications have already been described in the technical press. One such is " Leo ", the electronic office of the restaurant firm of J. Lyons and Co., which works out the weekly wage packets of 7,000 of their London employees, makes a daily analysis of the trend of bakery orders in Lyons' teashops and is rented in its spare time by a number of outside bodies.[1]

Another example is the " magnetronic reservisor " used by American Airlines in their New York Office. This electronic " memory " can instantly answer an inquiry by any of the company's sales offices in the New York area as to whether seats are available on any scheduled flight. If the customer makes the

[1] *Planning*, loc. cit., p. 73.

reservation, the clerk informs the computer by using a key system, and the number of available seats for the flight is decreased by the number of seats sold to the customer. The reservisor is interrogated on the average 35,000 times a day.[1] Among its many advantages is its quicker response to inquiries and its flexibility, which permits a far higher number of reservations to be completed than through the methods currently in use. However, its high cost makes it economically impracticable except at centres where a very large volume of daily passenger traffic is the rule.

Advantages of Automation

Automation has several economic advantages. John Diebold has summarised them as follows.[2] It reduces production costs. It brings about safer working conditions and improved operations, and this in turn means higher output and less waste. It improves methods and makes it possible to do new things (e.g. the production of fissionable material). It has created a new industry (concerned with the design, manufacture, installation and maintenance of automatic control equipment) and new professions. It makes for greatly increased productivity of capital equipment and the labour force.

Briefly, automation represents a trend in man's continuing search for greatest results with least expenditure of human and material resources.

Sectors Likely To Be Affected

With respect to the sectors of economic activity likely to be affected by automation, it may be noted in the first place that manufacturing industry—one area immediately concerned—accounts for a minority of the gainfully employed population, even in highly industrialised countries, and even in this area automation may be possible only in some types of manufacturing.

Preliminary attempts have been made to estimate the parts of the economy most likely to be affected by the new control technology and the extent of the changes that it may bring about. One study undertaken by an authority on industrial planning and economic

[1] Congress of Industrial Organisations, Committee on Economic Policy: *Automation*, Pamphlet No. 270 (Washington D.C., C.I.O. Department of Education and Research, 1955), p. 9.

[2] *Management Record* (National Industrial Conference Board, United States), Sep. 1955, pp. 356-359.

development [1] suggests that in the United States the industries most directly affected or likely to be directly affected by automation employ less than 10 per cent. of the total labour force and that it is highly unlikely, even in these industries, that employment in any one industry could be reduced by as much as 50 per cent. over a 20-year span, on the assumption that no increase in the demand for these products occurred during that time. Industries where a high degree of automatic production has already been or is likely to be achieved include chemicals and liquid fuels, cement and brick, beverages, fibre and textile products, paper products, glass and ceramic products, machinery and machine-tool production, mining, communications and some areas of retail trade. Industries considered likely to be only incidentally affected, although able to use some automatic machines, include agriculture, transport, construction, forestry and wood products, the garment industry and shipbuilding.

Outside of the manufacturing sector, the service industries will unquestionably make extensive use of automatic and semi-automatic machines. Proprietors will certainly have better records and control systems for their shops ; and professional men will be able to save time and develop higher quality services through the use of new machines.

Past experience and current developments suggest furthermore that many new industries may grow from the impact of automation and its technical requirements. Already, for example, automation has given tremendous impetus to the growth of one new industry—electronics, which in the United States not only doubled its output of industrial recording and controlling instruments between 1950 and 1951 but has continued to expand at a rapid pace. The use of record and control instruments in industry is one indicator of the rate of installation of automatic production machinery.

With respect to the areas of the world likely to be affected, the safest prediction is that no area will remain unaffected. So far as the pace of economic development is concerned, it has been suggested that automation may well help to short-circuit the slow, costly process of industrialisation in the underdeveloped countries. The argument runs that, in their efforts to industrialise rapidly, these countries are handicapped by a shortage of capital and a shortage of trained labour. The capital and labour force require-

[1] Richard L. MEIER : " Automatism in the American Society ", quoted by John DIEBOLD in " Automation—The New Technology ", in *Harvard Business Review* (Boston, Mass.), Vol. 31, No. 6, Nov.-Dec. 1953, p. 70. See also Martin PACKMAN : " Automation of Industry ", in *Editorial Research Reports* (Washington, D.C.) Vol. 1, No. 1, 5 Jan. 1955, p. 6 ; Walter S. BUCKINGHAM, Jr. : " Industrial Significance ", in *The Challenge of Automation*, op. cit., p. 40.

ments of an automatic factory are relatively low per unit of output compared with those of more traditional plants. In certain circumstances automated plants may present another important advantage in underdeveloped countries : the fact that fewer workers are required diminishes the problems involved in shifting large numbers of workers to new industrial locations, particularly, for example, those connected with providing the housing and community services needed. By building a few large up-to-date automatic plants turning out a carefully selected group of products, therefore, the less developed countries might take rapid strides forward in their industrial development. Examples of such plants can already be found in the oil refineries in the Middle East, the new Brazilian fully integrated steel mill and the large fertiliser plant recently put into operation in India.

However, opportunities for short cuts in the less developed countries turn on many financial and technical factors as well as on the employment situation, and the possibilities tend to vary from one country to another. In any particular country there would have to be careful selection from the point of view of national economic and social policy of the industries to be developed along these lines rather than on the more traditional lines. Automated plants would, in any case, be exceptional, and the selection would be decided primarily by the need to provide specified types of goods with a maximum economy of resources.

Clearly any attempt to predict the impact of automation on the various national economies or the technical effects of automation in particular industries comes up against very great difficulties. The impact can hardly be divorced from that of other technological developments and other factors affecting economic and social progress. Moreover, much depends on the rate of its adoption in different industries and countries. This last, perhaps, is an all-important factor in attempting to weigh the economic and social effects of automation.

Although references to the " automatic factory " evoke the picture of a plant operating without any workers and controlled from one central point by a small group of men—and such a factory is technologically possible—the likelihood of one being built in the foreseeable future appears remote. In the first place, this mirage ignores the presence of maintenance workers, whose number, importance and skill requirements tend to increase in proportion with the degree of automation of a particular process. In the second place, the very intricate controls that would be required would make such a plant economically impracticable.

It is this consideration, perhaps more than any other, that encourages qualified observers to state that automation will not

invade business and industry as a tidal wave but gradually, affecting first one industrial sector and then another.

Another important factor is the relatively limited area of the economy, particularly from the standpoint of employment, on which automation is likely to have an important and direct influence in the foreseeable future.

Also, individual company managements are faced with a number of problems—not the least of which is to grasp fully the potentialities and limitations of automation in respect of their particular needs. They must weigh such advantages as are clearly ascertainable against the costs of installing the new process, and this involves not only the direct cost of equipment but also the costs and uncertainties involved in redesigning the production process or the product itself, retraining and reorganising the work force, as well as allowing for the uncertainties of the market in a dynamic economy.

It is true that some observers of the process of automation take the view that developments are likely to come fast and go far. They argue that once the possibilities are fully appreciated by management, its advantages will far outweigh other considerations, and obstacles can be overcome rapidly. On balance, however, it would appear that most experts insist that developments in automation will expand in a relatively slow and orderly way.

Other forces at work in the economy may also be expected to cushion the impact of automation, whatever the rate of application in particular countries and industries.

Technical Problems of Management

Clearly, whatever the industries affected and whatever the rate of application of automation, the change to automatic production processes raises many technical problems that can only be resolved through considerable thought and effort on the part of management.

For management, many of the difficulties are concerned with grasping the true meaning and possibilities of automation. Automation does indeed require a new philosophy. Moreover, in order to derive the greatest benefits from it management will need to revise and modify many of its established methods of technical organisation. This will require general acceptance by industry of a fundamental rethinking of the entire production process, including the redesign of the product itself in order to adapt it to automatic production methods rather than the search for automatic production methods adapted to existing product designs. Plants will also need to be redesigned, and machines will be grouped around the concept of related production processes rather than

in terms of the product itself. However, much engineering development and cost analysis will be required before general agreement is reached regarding the most effective way in which feed-back control technology can best be applied to existing manufacturing equipment.[1]

One of management's stumbling blocks in many countries is a tendency to look upon automation as a possible means of reducing labour costs exclusively. Automation may indeed reduce costs, but not so much by reducing labour costs as by making possible a higher output per unit investment through more accurate, faster production, with reduced spoilage, fuller utilisation of machine capacity, greater economy in floor space and reduced accident hazards—all of which are important in the final cost of the product.

This point is illustrated by the case of a United States chemical plant that had some 1,000 employees in 1948, when the management decided on modernisation involving also a 50 per cent. expansion in capacity.[2] In 1953 the plant had, instead of 700 production workers and 300 maintenance men, about 550 production workers and 450 maintenance men—i.e., about the same number of workers. Despite far more complicated processes, machinery and controls, the number of maintenance man-hours per unit of product remained almost constant, and production increased by 60 per cent. Maintenance now accounted for 45 per cent. of total wages instead of the previous 30 per cent. and, despite a 35 per cent. rise in real wages and a 50 per cent. increase in raw material costs, the unit cost in 1953 was substantially lower than it was in 1948 :

> A little quick arithmetic would disclose that the total man-hours per unit dropped only about one-third. That is not enough to offset the jump in real wage rates plus increased material costs. And that is precisely the point. The company figures that for every dollar saved by reducing the man-hour content of each unit, it saved at least three dollars through less production of substandard material, fewer customer complaints, better utilisation of equipment and elimination of overhead on " non-saleable " production.

Social Effects

Structural Problems for Trade Unions

Trade unions, as well as management, will have to think about automation and adjust their structure to the changes likely to take place. This point was emphasised by delegates to the last session

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[1] See, for instance, John Diebold : " Automation—The New Technology ", loc. cit., pp. 65-67.

[2] H. L. Waddell : " Progress in Automatic Production ", in *Mechanical Engineering* (New York), Vol. 75, No. 3, Mar. 1953, p. 208.

of the British Trades Union Congress. One delegate noted that many of the demarcation problems that now confronted the trade unions would be "blown sky high" because many of the jobs existing today would disappear. Another said that the movement would have to look again at many of its cherished traditional beliefs and be willing to change its attitude towards demarcation, classification and industrial unionism.[1]

Changes in skill requirements may also require new organisational efforts among groups in which trade unionism has so far made little progress in most countries.

Some Effects on Employment

Fears have been expressed regarding the impact of automation on employment. In the first place there is the question of what is likely to be the extent of reduction in employment opportunities in the industries where the trend to automation is accelerated. One observer has suggested that, fully automated, the automobile industry in the United States, which today employs over 1 million workers, could achieve the same production with 200,000. While this kind of development will certainly not occur for many years, it is a contingency that must be faced.

It is natural that anxiety and fear should be voiced by workers faced with uncertainty regarding their future employment, particularly the less skilled and older workers who, if displaced from their present jobs, have limited possibilities of fitting themselves for or obtaining new employment.

However, the problem of the displacement and re-employment of individual workers must not be confused with the impact of automation on the trend of total employment. The general employment situation is dependent on many forces, and automation may be or become one of these, but there is no reason to suppose that it is likely to become a negative influence in that situation. In fact, every historical indication points in the opposite direction. The growth of new employment opportunities and the continuous redistribution of manpower in relation to these changing opportunities are characteristic of the industrial era. There is no intrinsic reason to associate shifting opportunity with unemployment. But there is every reason to reinforce the measures taken to promote and to achieve full employment in each economy and to continue to make this a dominant aim of public policy.

Even in the industries likely to be most directly affected by

[1] *Labour* (London, T.U.C.), Oct. 1955, p. 220.

automation, the employment situation may differ from one industry to another. There may be a drop in total employment in many of these industries but in others there may be simply a shift of opportunity.

Moreover a number of other factors may tend to diminish the impact of automation on employment. One is the long-term tendency for living levels to rise and for more goods to be consumed per person. This can make for a market physically capable of absorbing a greatly increased output of goods and services, particularly if lower production costs attained through automation are passed on to consumers in the form of lower prices. Another factor is the steady long-term trend towards the reduction of working hours, a trend likely to gather force with the progress of automation, where shorter shifts, with continuous machine operation, may well be a characteristic method of organising work. There may also be a fall in the ratio of the working population to the total population in a number of countries as a result of population trends and social policies, such as longer schooling and the spread of leisure. Finally, a gradual rate of advance towards more automatic production processes would also limit the impact of automation on employment.

None the less, in spite of these various mitigating factors, there will be labour displacement, and this raises a general social problem, which must be met through co-ordinated planning and effective measures to facilitate the individual job changes that become necessary.

Indeed, it is in this area that automation presents an immediate challenge, for the average worker is bound to look at automation in terms of its effects not on jobs in general but on his job. He may know that automation may rid the world of much dull, arduous or hazardous work, and offer better and safer working conditions and more interesting and responsible duties, but his main question will still remain: "How will it affect my job?" And for those displaced by automation—and there will be many—the vital question will be: "How can I find other useful and satisfying work?"

In this area of policy, much thought needs to be given to finding the most effective means of providing social protection and financial assistance to workers forced to change jobs and of avoiding the individual hardships often associated with periods of rapid and far-reaching technical change. Particularly difficult problems arise in the adaptation and re-employment of older workers; and the demand for more highly skilled workers may make it harder than in the past to find useful work for the unskilled.

Changes in the Composition of the Labour Force

In the employment field, however, one consequence of automation is becoming quite clear: there will be a substantial change in the relative numbers of skilled, semi-skilled and unskilled workers. Some existing skills will become obsolete; some may be diluted by a further division of labour; but there will be especially a demand for new skills, usually of a higher order. This means that while industry will require fewer and fewer unskilled workers, increasing opportunities will be open to workers with higher skills and to technicians and engineers. Because of the increased demand for higher degrees of skill for many of the new jobs and for greater versatility on the job, training and retraining will need to be developed considerably beyond their present levels.

The installation of complex and expensive equipment, the main function of which is to perform repetitive jobs more rapidly and accurately than can human labour, will tend to eliminate many unskilled and semi-skilled jobs. On the other hand the routine supervision of these machines will place a premium on the ability of workers to grasp the more complex operations under their control and to show initiative and resourcefulness in meeting the occasional emergencies that are likely to occur despite the elaborate controls built into the machines.

More important, perhaps, will be the need for maintenance workers, whose skills will of necessity vary from those of the traditional maintenance mechanic. The proportion of these workers has increased already in automated plants, and in the case of electronic feedback and computer technologies a relatively new occupation is gaining in importance, that of electronics technician. The importance of these workers in the new type of plant is evident, since the economic advantage obtained by the use of this equipment depends primarily on " keeping the process going ", and stoppages therefore become increasingly costly.

New skills will be required in the manual, technical and professional categories alike. What these new skills will be is still far from clear, since the new technology is in a state of rapid evolution. Guidance will largely have to be sought among the companies with experience. Alertness to the new requirements, and to the opportunities they represent for vocational training and technical education, will be required of all those with responsibilities in this field. Flexibility in thinking will also be necessary, and a willingness to revise existing programmes and methods.

A large responsibility for training will necessarily rest with individual companies. Managements will be best qualified to indicate the needs and to provide at least a share of the training.

They can save time and money by sharing experience and in some cases training facilities.

More people will have to be trained in some of the traditional skilled manual occupations, since the experience of many companies with automation shows a need for more skilled workers, especially in maintenance, than before. In this connection, a careful study of the ways in which people acquire the necessary skills will be needed. Although apprenticeship and formal training programmes will no doubt have to be strengthened, as well as adapted to new needs, experience in industry suggests that more informal methods —such as on-the-job training—produce a substantial number of skilled workers.

It seems clear already that the spread of automation will considerably alter and increase the demand for technological education. More and improved facilities will be needed, and their links with industry will have to be strengthened if they are to meet the new skill requirements. The facilities for training engineers and other professional and technical personnel will also have to be expanded. A review of existing facilities in the light of the increasing demands of industry for technicians and professional staff, and particularly for the in-between categories of semi-technical and semi-professional personnel, will be an important step in planning the adaptation of training services.

There is also the important problem of training management in the leadership and other skills required to cope with the new demands of automation. The increase in the number and skill content of jobs as well as in the ratio of managers to employees (because of the increased value of equipment and the increase in the scope of the work process under a manager's control), changes in plant organisation and the pace and complexity of operations and in the decision-making process are all factors that involve changes in management's responsibilities and attitudes and in the types of leadership it must provide.

> In the automatic factory, managers will of necessity have to become more co-operative and more imaginative in their co-operation. There will be a need for closer team-work both up and down the executive and across the functional lines of the organisation. The gift of prophecy will be a near essential, for it will be important that all possible difficulties shall be foreseen. Management will have to be more communicative, instructions will need to be more fully considered, less tentative, more explicit and positive than hitherto. Transmission of communications will need to be quicker. . . .[1]

Many companies have already found it essential to expand their " management development plans " to take account of these

[1] Frank G. Woollard : " What Automation Means ", in *Personnel Management & Industrial Equipment* (London), Sep. 1955, p. 145.

increasingly important skill requirements for effective performance by their managerial teams.

Supervisors and foremen will also be required to develop their leadership skills. Attitudes towards supervision may need considerable modification, and new forms of training may be needed. The growing emphasis now being placed on adapting supervisory training to the changing human and technical needs of industry is encouraging.

Labour-Management Relations

Automation also raises a variety of problems in the area of labour-management relations. Many of these concern wages, hours, safety and other conditions of work; others relate to seniority and job security; still others bear on the methods and techniques of consultation and co-operation.

It seems clear that one consequence of automation will be a substantial improvement in working conditions and, above all, greater safety. However, new safety problems will arise, and these will have to be analysed in advance and appropriate forms of training introduced within industry in order to develop the new types of safety consciousness that will be needed to profit fully from the possibilities for greater safety.

It is also predicted that automation will improve working conditions by eliminating much arduous physical labour and much "dirty" work in industry. Automation offers opportunities for cleaner and safer work and also for making the plant environment far more attractive than in the past.

The changes in the work content of jobs will call for an extensive re-examination of existing wage administration policy and practice. One area where past developments have tended to emphasise narrow and rigid demarcation lines—job classification—will need to be re-examined by both managements and trade unions in the light of new conditions. For instance, in plants where automatic operations have replaced a number of narrowly classified jobs—for example, where a number of workers on separately classified grinding jobs have been replaced by a single operator controlling an integrated grinding line—experience shows a logical tendency to establish a single new category requiring a generalised knowledge of the job family, in this particular case, grinding. A natural consequence is for the union to claim for this new post a higher rate of pay based on greater versatility and more responsibility for the operation of complex and expensive equipment.

Related industrial concepts and practices will need to be carefully re-examined, such as time study—which, many observers argue, will be outmoded in its present form, since the pace of

production will be set by the machine—and job evaluation, where new difficulties will be presented by changing job content. Existing incentive systems, particularly individual forms of piecework, are also certain to undergo important changes, and much thinking will be needed in order to revise them.

As for seniority, existing contract clauses and plant customs may be found unsatisfactory in the light of the new conditions brought about by automation. Both management and union in a particular plant will unquestionably be brought to reconsider the existing rules, which have generally developed from relatively stable operations with long-established and clearly defined occupational groups. Under the new conditions, broader seniority provisions—plant-wide or even extending to all the plants of a company—should facilitate the transfer of workers and provide them with a larger degree of protection in continued employment.

In the same general connection, provisions governing layoffs, rehiring, transfers and promotions will call for re-examination by management and union with an appreciation of the problems of the individual workers concerned as well as of the needs of the undertaking. New means must be found to combine increased adaptability with increased job security.

Finally, there will be continuing problems of labour-management co-operation arising out of the need for consultation on changes in technology, plant organisation and work assignments. Existing methods and techniques will have to be examined to ensure that they are adequate to bear the heavier burden that will be imposed on them, particularly in meeting the short-term problems of transition. Changes in the organisation and content of work will raise new problems of group and social relationships. These will affect not only the organisation of supervision but also the approach to many other aspects of in-plant relationships, including communications and information practices and channels for in-plant consultation.

Automation is also likely to give fresh impetus to the movement for shorter hours of work (both annual and weekly hours). The consequent increase in leisure time raises many problems of its own, not the least of which relate to the nature of the educational system and of recreational activities.

Implications for Social Policy

In this brief review of some of the major technical and human problems of automation that can be discerned, passing reference has been made to a number of areas of industrial relations and social policy that will undoubtedly feel its impact.

It is not the purpose of this article to suggest, on the basis of current experience, detailed specific solutions to the problems raised by automation. This is not yet possible. What is urgently needed is a measure of coherent planning, based on consideration of the problems involved and of their implications for social policy, and a sustained sense of responsibility for future developments on the part of industry, labour and government and of educational bodies and research groups.

It is true that each of these areas has had its problems in the past. Much study has been devoted to some, and solutions have been worked out either through collective bargaining or through action by the State. But continuous and careful consideration is needed, not only to meet but also to anticipate the new problems and to bring to their solution the new twists necessary to facilitate the change-over to automation.

The speed with which automation comes to a particular industry will naturally substantially affect the degree of intensity of these problems. Since it is generally agreed that changes are likely to develop gradually, it will no doubt be possible to make adjustments over time that would not be possible if they had to be done overnight—such as retraining key employees or letting time work off surplus labour.

Despite some diversity of opinion as to the extent and speed at which automation is developing and the social impact that it is likely to have, there is widespread consensus on one important point : the need for an extensive study of all aspects of the problems associated with automation as a basis for the early and co-ordinated action required to ensure an orderly transition with a minimum of social dislocation and the greatest possible benefit to all sectors of the community. This is emphasised by management, labour and government services in all the countries in which automation is making an appearance.

It is appreciated that a wide range of studies will be required : general studies of the progress of automation in the economy as a whole, studies of the rate of introduction of automation and its effects in each industry, of the changes in the size and composition of manpower requirements, of changes in levels of productivity and of modifications in piecework and incentive pay systems and in hours (including shift work) and other working conditions. Case studies will need to be made on a factory basis. Attention will have to be paid to the psychological consequences of new working conditions, such as " perceptual fatigue " on monitoring jobs or work in isolated stations, to changed social relationships inside the workplace and to new problems of supervision, and changes in plant organisation and in line and staff relationships. Special

analysis will be needed of the experience of displaced workers in order to probe the difficulties and find the most effective remedies.

There is equally widespread recognition that, in the light of the findings of these studies, a series of inter-related measures will be needed to reinforce those already applied by industry and government to protect the labour force.

Measures already suggested refer either to means of protecting workers from unemployment during job shifts or to means of ensuring that adequate purchasing power is put into the hands of workers—who constitute a dominant sector of the consuming public—in order to ensure the high and rising level of effective demand in the mass of the population necessary to support increased production and productivity. Specific measures include the extension of dismissal compensation, widened opportunities for transfer, upgrading training and promotion, broadened seniority provisions to assure better protection to workers and to encourage inter-department and inter-plant transfers based on seniority, revision of job classification, with appropriate wage increases to take account of greater skills and new responsibilities and to ensure to the worker a fair share of the increased productivity of the equipment they control, and a wider application of guaranteed annual wage provisions as an essential element of security for the worker and as a stabilising influence in industry. The last-mentioned measure, together with adequate wage increases and a reduced working week, is considered by many trade unions as the best means of providing " a more secure basis for mass consumption throughout the year " and " of spreading the benefits of mass consumption to the great mass of . . . families ".[1]

Considerable emphasis is naturally placed on the extension and improvement of vocational training facilities and on the respective responsibilities of industry and government in the retraining of displaced workers. Special attention is devoted to the problems of skilled and older workers. Improved employment services are regarded as essential. An expansion of social security provisions, with earlier retirement for displaced older workers unable to find new jobs and an improvement in unemployment compensation also figure prominently among the measures suggested to cushion the shock of technological displacement.

It is significant that each of the groups primarily affected—management, labour and government—has given consideration to these questions and is alert to the need for study and action on the various specific problems arising or likely to arise in consequence of the spread of automation. In the United Kingdom, for instance,

[1] C.I.O. Committee on Economic Policy, op. cit., p. 12.

commenting on the plans of the British Institution of Production Engineers to hold a conference in 1955 on " The Implications of the Automatic Factory ", *Scope* observed—

> The implications are upsetting ... to traditional standards of management, administration, product design and manufacturing methods as much as to the prevailing ideas on employment and wages. All the more reason, then, for frank discussion.[1]

In an article in the *Commercial and Financial Chronicle*, John Diebold stated—

> Fundamental to the successful integration of Automation into our mechanised society is the recognition by all parties concerned—unions, management, and government—that they have a common interest. No one, least of all the American businessman, wants to see increased unemployment. All of us stand to gain by Automation as long as we stand together.[2]

In a recent pamphlet the United States National Association of Manufacturers emphasised that automation would bring new responsibilities to industry, including greater responsibility for the reallocation of manpower to dry up temporary pools of unemployment.[3]

Industry spokesmen generally hold the view that automation will prove an unquestioned boon and that any expanding and full employment economy will easily absorb an increased industrial output without serious dislocation. They agree with labour, however, on the need for studies and for measures to meet the problems of workers who will be displaced.

The trade union movement, both nationally and internationally, does not dispute the promise of automation but is more apprehensive of the short-term consequences and has given particular consideration to the social problems raised. In the United States no part of the trade union movement opposes technological change —such change is welcomed. But many union leaders are deeply concerned with the transitional problems. For example, the President of the United Automobile Workers, Walter Reuther, has declared—

> Now we enter the second phase of the industrial revolution, and the impact of automation—for good or for evil—is magnified a thousandfold. The need for enlightened social policies becomes imperative.[4]

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[1] *Scope* (London), Dec. 1954, pp. 31-33.

[2] " Automation and Its Uses ", in *Commercial and Financial Chronicle* (New York), Vol. 181, No. 5424, p. 20.

[3] National Association of Manufacturers : *Calling All Jobs : An Introduction to the Automatic Machine Age* (New York, 1954), pp. 20-21.

[4] *Automation* (Detroit, U.A.W./C.I.O. Education Department, 1955), p. 4.

The C.I.O. Committee on Economic Policy, in a research pamphlet on automation[1], raised a host of technical and human problems requiring study and consideration, and stresses the need for combined efforts by labour, management and government to smooth the transition to the new technological era.

The President of the American Federation of Labor, George Meany, also stated that the answer to technological change lies in smoothing its transitions and cushioning the shocks that attend it.

> This means, in the immediate sense, the establishment of severance pay, retraining of skills, reorganisation of work schedules. These are social costs that industry will have to bear in order to avoid the wasting of human resources and to avoid our calling on government to bear these costs if industry fails to do so.[2]

From the beginning, the United States unions have tried to draw the attention of their members to the implications of automation. The C.I.O. adopted a first resolution on the subject at its 1953 Convention and a second in 1955. It also convened a conference on automation in 1955 in order to focus attention on the problems arising from developments in this field and to discuss the measures required to cushion their impact.

In the United Kingdom, the President of the Trades Union Congress stated at the 87th Annual Congress in September 1955 :

> We can visualise the time when there will be an abundance of consumer goods which will meet the requirements of every man, woman and child on the face of the earth. We can welcome it for this reason, or we can fear it because we may believe that it will rob us of our individuality, of our skills and perhaps of our livelihood.... To fear automation would be the cowardly approach ; it could arise only from a sense of weakness. If we are confident in our strength as workers and our workers' organisations—and we should be—we have no need to fear. We should immediately set ourselves to the task of controlling these developments, not restricting them ; of turning them to our advantage and not our disadvantage.[3]

After discussion of the question, the T.U.C. adopted a resolution welcoming the opportunities for higher living standards presented by technological advances generally and, foreseeing that these opportunities would be attended by complex human, social and economic problems whose solution would depend on a larger measure of workers' participation in industry through joint consultation, urged continued study of the problems in order that the whole movement might be efficiently equipped to deal with the subject.

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[1] Op. cit.

[2] George MEANY : " What Labor Means by More ", in *Fortune* (Chicago), Mar. 1955.

[3] " The President's Point of View ", in *Labour*, Sep. 1955, p. 188.

Although their proposals differ in detail and in relative emphasis, unions on both sides of the Atlantic are substantially in agreement on the measures they consider should be taken in order that the advent of automation may in fact herald a new and a better life for all members of society and not new, terrifying prospects of economic and social upheaval and disaster. Their particular emphasis is on upgrading, retraining and transfer within the plant, protection for displaced persons, reduction of hours, and maintenance of income and purchasing power.

Governments are equally alert to the urgency of studying and taking measures to deal with the problems connected with automation. In the United States the Subcommittee on Economic Stabilisation of the Joint Congressional Committee on the Economic Report is making a study of automation to determine what social policies are necessary to ensure that the long-run benefit to be derived from increased productivity does not produce serious or undue short-term unemployment and dislocations. In the United Kingdom the Department of Scientific and Industrial Research is undertaking a survey of automation developments and will sponsor research into these and related problems. In Europe the European Productivity Agency is sponsoring surveys to ascertain the extent to which the new techniques of automation have already been applied in various sectors of industry and the possibilities of future development ; these surveys are to provide the basis for detailed consideration of the technical and human problems of automation.

At the individual plant level, too, much is already being done to dissipate the fears of the workers and to facilitate change to new production methods. As always, what is essential is a willingness on the part of management to share its plans with the workers, to keep them informed of all phases of the new techniques that affect their prospects of continued employment—the need for dismissals, transfers and training, and the opportunities for promotion and to plan ways of making the changes. It is here, particularly, that the time element can be turned to good use :

> ... For one outstanding characteristic of automation is that it takes time to install. Even after an exploratory stage has been completed, equipment must be designed and manufactured, men must be hired or trained for new occupations, physical installation and transition problems must be faced. All of this takes time—not days or weeks, but months or even years, and with problems like displacement and personal adjustment, time, of course, presents a major opportunity that alert and socially responsible companies and unions can use to good advantage.[1]

[1] George P. SCHULTZ and George B. BALDWIN : *Automation—A New Dimension to Old Problems* (Washington, D.C., Public Affairs Press, 1955). See also " The Effect of Automation on Industrial Relations ", by the same authors, in *Monthly Labor Review* (U.S. Department of Labor), Vol. 78, No. 2, Feb. 1955.

Conclusion

There is evidence that automation is beginning to receive the attention it merits. Recognition of the need to analyse the problems and to reinforce measures of social protection in certain areas of policy are two steps forward. Recognition that automation and other technological developments are placing a heavy strain on the labour-management structure and that increased consultation within industry is a necessity is a third step in the direction of preparing for the future.

However, recognition of the problems is not enough. Much has to be done to meet the problems ahead, and it is probable that attention will centre in the near future on action. Here there is an evident need for continuing and intensified co-operation on the part of those more directly concerned—co-operation that can only come about through conscious effort and thought about the more far-reaching social implications of automation. Above all, there is a need to keep automation in its place—that is, as a group of related concepts and technological developments offering great possibilities for the raising of levels of living and welfare—and not to assign to it an inexorable and over-riding role to which social policy must be subordinated for many years to come.

In the words of one of the principal speakers at the Conference on the Automatic Factory organised by the Institution of Production Engineers in the United Kingdom, Mr. F. G. Woollard, for many years engaged in the development of flow production methods in the British automobile industry—

> We must always remember that automation is not a device with which to outlaw, displace or dispense with man. It is not a contrivance nor an invention to deprive man of his heritage—his right to work and to enjoy the fruits of his labours. It is a means of increasing man's stature and for extending his ability to do more and more useful work; to produce in greater volume with less physical effort or mental strain—a means whereby he can bring to his fellows the fulfilment of their lawful desires and, to their homes, comfort and leisure. We must always remember that men were not made for machines, but that machines were made for men. Whatever device or emblem we may adopt to typify "automation" the motto must be... "Machines in the Service of Man".[1]

[1] Quoted by L. W. Bailey, in his report on the Conference: "The Automatic Factory—What Does It Mean?", in *Mechanical Handling* (London), Vol. 42, No. 8, Aug. 1955, p. 482.

Productivity in Underdeveloped Countries

by

S. TILLES

Some of the less industrially developed countries, in their efforts to achieve rapid economic progress, are devoting much thought to programmes for raising productivity in all sectors of the economy. In such programmes there is sometimes a tendency to emphasise one item—capital investment—at the expense of others. The following article stresses the importance of other items, such as the improved utilisation of manpower, equipment and material and the expansion of industrial engineering methods, and suggests that there should be in each of these countries, as part of the productivity programme, a number of specialised centres to give information on these subjects and to provide training.

Professor Tilles has served as a productivity expert in Israel for the last two years under the I.L.O. programme of technical assistance to less developed countries. He conducts courses in industrial engineering at the Technion, the technological university at Haifa, and is an advisor to the Israeli Institute of Productivity.

IN the numerous studies dealing with the economic expansion of underdeveloped areas the problem of productivity is usually discussed as an aspect of the broad economic issues related to the problem of industrial expansion or in terms of a detailed account of what has been accomplished in a specific community or enterprise. That is not the intention in this article. No recommendations will be made concerning the economic prerequisites for a productivity programme nor will specific instances of increased efficiency in particular plants be quoted. Instead, an attempt will be made to describe the organisations required, somewhere within the national framework, if expanding industries are to receive the guidance and assistance that are necessary to their early development.

The generalised recommendations contained here are based on two years of observation in a rapidly developing country—Israel. Many of the organisations listed have already been established there, and are making a significant contribution to the increases in productivity that have been observed. However, several of the organisations do not yet exist in that country, and their absence may be readily discerned.

The problem of increasing the productivity of a particular undertaking is essentially the problem of increasing the degree of application of various techniques at all levels of the organisational hierarchy. In Israel experience seems to indicate that the most effective means of furthering the use of new techniques is a broad programme of education in their use. Consequently it is primarily educational activities that will be emphasised.

The Concept of Productivity

It is unfortunate that in so many of the treatises on productivity the term is interpreted as output per man-hour. While for purposes of statistical measurement and for certain other purposes it may be necessary or convenient to relate output to the input of a single factor only, and while special interest may attach, for various reasons, to the productivity of labour, the choice of only one concept of the general term " productivity " is unfortunate, since it seems to imply that an increase in productivity necessarily means an increase in production per man-hour—and therefore either more production (with possibly concomitant distribution problems) or less labour (with possibly serious technological unemployment). Productivity is by no means limited to this interpretation alone, despite the fact that output per man-hour is a convenient index when making economic comparisons.

In this article the concept of productivity is understood as the ratio of output to input in a more general sense. The significance of this general concept is not merely that we may wish to measure the productivity of other resources besides labour, for measurement of productivity is only the first step. What is really important is the improvement of productivity and; if we insist on always using productivity in the sense of labour productivity, we shall be led by our definition to concentrate primarily on labour-saving techniques.

Actually, there are many equally valid definitions of productivity. Thus, for a factory, output may be defined as money volume of sales, added value, number of units produced, or even net profit. Likewise input may be defined as labour hours, quantity of raw material, capital invested, machine capacity, foreign

currency required, etc. Any combination of these factors may be chosen, or all of them. In Israel, for example, it is quite common to judge the success of an industrial unit by taking added value as output and foreign currency requirements as input.

There are many different kinds of productivity. In selecting the specific interpretation or interpretations to be used, the following two criteria should be used as a guide : *(a)* the usefulness of the ratio selected as a basis for decision ; *(b)* the possibility of measurement with the definitions chosen.

The Measurement of Productivity

Regardless of the definition of productivity that is of primary interest, the basis of productivity measurement remains the same—an adequate system of cost and financial accounting within each enterprise, with all the subsidiary internal records that this implies. Unless a factory has such a system, it is impossible either to assess its present level of productivity (except by the most subjective estimate), or to arrive at any logical conclusions concerning the methods to be used to improve the existing situation.

The first step in the attempt to improve the productivity of an undertaking, therefore, is the introduction of an adequate accounting system. However, if it is an industry (or an entire economy) that we are concerned with, it is necessary not only to record the performance of individual enterprises but also to accumulate this information from each of the other units in the industry concerned, and to calculate some type of over-all index. From the point of view of general planning, such data are extremely significant, since they permit *(a)* a comparison between enterprises within an industry; *(b)* a comparison with comparable industries in other countries ; and *(c)* an estimate of the degree to which progress is being made over the entire industry.

In an underdeveloped area the introduction of such a system represents an enormous task. It implies—

(a) convincing a large number of managers of the need for recording and supplying such data ;

(b) training a large number of cost accountants to develop the internal data ;

(c) establishing a central statistical office for the industry or industries concerned ;

(d) training the required number of statisticians ;

(e) training auxiliary clerical staff in methods of accumulation and presentation of such data.

Fortunately it is not necessary to wait until such a long-range programme is completed before attempting to improve productivity. It is quite possible—indeed, in underdeveloped areas vitally necessary—to do a great deal towards improving productivity even before either the present level of development or the precise effect of the action taken can be determined accurately.

Techniques for the Improvement of Productivity

In discussing the definition of productivity, a question of ends was considered. However, no matter what interpretation of the end to be achieved is decided upon, there remain a wide variety of techniques that may be used for improvement. These techniques may be divided into four broad categories according to whether they are used to obtain improved utilisation of (1) manpower resources ; (2) equipment resources ; (3) raw materials ; or (4) any or all of the above.

Each of these sets of techniques will be discussed in relation to factors that are within the control of the individual enterprise —for example personnel, improved methods or factory layout— as opposed to external factors, such as marketing, purchasing and factory legislation. It must be admitted that in practice the manager or consultant very quickly realises that any problem must be considered from both its internal and external aspects if a proper solution is to be found. For example, the problem of human relations in a factory is governed at least as much by the sociological environment in which the factory exists as by the personal relationships between the members of the labour force during working hours. Or, to take another illustration, the problem of marketing is influenced as much by the scope and intensity of market research or the economy within which the factory operates as by the design and production of the item made.

In the broadest sense it may be claimed that almost any aspect of national life has some influence on productivity. However, in order to limit the scope of this study, only the techniques that are most closely related to the internal problem of productivity are considered.

It is important to note that the maximum increase in productivity is to be achieved only by making the fullest use of all four of the above groups of techniques. However, it is quite impractical to attempt to introduce all these techniques into an enterprise simultaneously, and some may be much more expedient than others. For example, while many considerations may rule against the immediate introduction of some of the techniques for improving the utilisation of manpower resources, a considerable contribution

to the economy of an underdeveloped area may be made (usually without encountering adverse reaction, if the experience of Israel may be considered typical) by the introduction of techniques to achieve fuller utilisation of equipment or material resources. A more extended discussion of this point will follow, after each set of techniques has been discussed more fully and its institutional requirements enumerated.

Improved Utilisation of Manpower

Among the techniques for improving the utilisation of manpower resources, the following are of greatest interest to the individual enterprise :

(1) selection procedures, or methods of finding the most suitable persons for the jobs available ; this requires a comprehensive programme of job analysis and description and the widespread use of modern testing techniques ;

(2) training, perhaps the most important of the techniques in this category, since most underdeveloped countries suffer from a critical lack of skilled workers ;

(3) motivation ; particularly in underdeveloped areas, the problem of employee motivation in an evolving industrial society is both acute and complex ;

(4) safety ; in an environment where machinery is often strange and unfamiliar, the loss of skilled manpower through preventable accidents represents a serious waste of a scarce resource.

Any enterprise may increase its productivity very considerably by the introduction of the techniques listed above. However, if it is to do so, it must first be convinced of the necessity, and then provided with the necessary skills and guidance. The national institutions required to achieve this will be discussed in the following paragraphs.

Job Analysis and Description

One of the first steps in the introduction of a rational personnel policy is the development of complete job descriptions of the positions in the enterprise. By this is meant the listing of all the duties and requirements for each of the jobs existing in the company and the attributes required to perform the job properly. Job descriptions are essential in any organisation. They form the basis not only for the proper selection of workers but also for the development of an organisational structure and the planning of a comprehensive training programme.

In order to obtain the widespread use of such descriptions it will be necessary to set up a central national agency to act as a clearing house for the exchange of information on job descriptions. Job descriptions are not only a basic part of personnel practices within a specific organisation but also a fundamental aspect of national labour policy. For example, the comprehensive planning of vocational training programmes, the operation of employment exchanges and the development of a national wage policy (where one exists) also benefit greatly from the existence of such descriptions.

It will also be necessary to train a sufficient number of job analysts to fill the needs of at least the larger local organisations. Some job descriptions will undoubtedly be standard for the whole country and will therefore not have to be dealt with separately in each organisation. However, most enterprises, particularly in the underdeveloped areas, evolve tasks peculiar to their own structure. They therefore require the services of their own job analyst—or group of analysts, according to the size of the enterprise—to observe and describe the duties of the jobs involved and to assist in the formulation of job specifications.

Selection

Once the requirements of a job are decided upon, the next step is to find an applicant who conforms to the requirements. The following methods are used in selection, usually jointly: *(a)* the gathering of information on application blanks (where literacy is not a problem); *(b)* interviewing; *(c)* testing.

The first two of these represent no particular problem, though there is considerable room for improvement in the present practice of many organisations. The third technique—testing—is becoming an instrument of increasing scope and complexity as more and more is discovered in the field of psychology, and as the area of application of this information widens. Today tests are increasingly used not only to determine present ability but—more important for underdeveloped areas—potential capacity to benefit from training. Consequently it is urgently necessary that underdeveloped countries should have a centre or centres for psychological testing.

Such centres exist in Israel, primarily for the use of the schools and the vocational guidance programme for children. However, their utilisation by industry as a means of assistance in the selection of employees is slowly increasing. An interesting use of such a centre was recently made, in co-operation with the I.L.O. productivity mission, to select candidates for training for the new vocation of productivity technician. While it was recognised that the

testing of the first groups would serve mainly to check the validity of the tests used, this procedure was very helpful in eliminating beforehand those obviously unsuitable for training.

In an underdeveloped country the need for people with new skills, either vocational, technical, or administrative, is usually acute. Consequently, one of the corollaries of industrial expansion or general economic growth is a pressing need for a wide variety of educational programmes, and to make the fullest use of these there must be proper selection of candidates. In this a testing centre can make a valuable contribution.

Training and Education

It has been pointed out above that economic growth requires a commensurate expansion in the educational activities of a country if development is to be maintained. Unfortunately the importance of skills and abilities at every level—from worker to manager—seems to be all too little realised. There seems to be a notion that a factory can be created by merely erecting a building, installing modern machinery, and hiring the required number of men. Nothing could be further from the truth. A successful factory is primarily a group of men who possess certain required skills and who, in addition, have found the necessary equipment to carry on production. If the abilities are there, the factory is an economic proposition. If not, an early failure is inevitable.

A comparison between the amounts spent on the acquisition of new equipment and those spent on the training of personnel by individual enterprises shows that this is not always realised. It is not at all unusual to find large organisations with much new machinery but without a training officer or any formal training programmes for their workers.

Types of Training.

The general areas of training most closely related to the maintenance of economic development may be classified in the following general groups : *(a)* vocational training in specific operations in the enterprise ; *(b)* supervisory training, not only in the technical aspects of the industry concerned but also in the attributes required for effective foremanship (human relations, job instruction, methods improvement, rudiments of costing, etc.) ; *(c)* specialist training in the professions closely related to the problem of productivity in the enterprise (accountants, industrial psychologists, engineers, statisticians, etc.) ; and *(d)* training in management methods for existing and potential managers.

Training of Workers.

No details of the institutional requirements for an effective programme of vocational training will be given here, in view of the scope and complexity of the problem, particularly in underdeveloped areas, where the numbers of people to be trained and the areas in which training is needed are so great in relation to existing facilities. However, it cannot be stressed too much that the degree of productivity possible depends on the skills and knowledge of the workers concerned, and that this in turn is a function of the effectiveness of the vocational training available. Consequently an urgent requirement for the success of a national productivity programme is the closest collaboration between the vocational schools and the institutions attempting to improve the productivity of specific areas of the economy. The institutional means of achieving such collaboration will be dealt with later.

Training of Supervisory Workers.

The importance of supervisory training was well summarised by the Meeting of Experts convened by the I.L.O. to discuss the problem of increasing productivity in manufacturing industries. In their recommendations on practical methods of increasing productivity in these industries [1] they stressed the importance of the supervisor in the organisational hierarchy:

> Foremen and supervisors can make specially important contributions to higher productivity. They constitute the principal link between higher management, scientists and engineers on the one hand and operatives on the other ....
>
> There is growing recognition of the cardinal importance of adequate training for foremen and supervisors not only in their technical and administrative duties but also, and perhaps especially, in the principles of human relations, since it is of the highest importance that there should be mutual confidence and friendly relations between supervisors and their personnel.

In order to enable supervisors to carry out their task, particularly in view of the increased responsibility they carry in underdeveloped areas, a vigorous programme of training is required in the following fields: the technology of their specific industry; techniques of supervision; company policy and information; and general studies.

Large organisations may not have difficulties in training supervisors in these subjects. If they are able to obtain the services of a competent training officer they will probably be able to develop

[1] See "Practical Methods of Increasing Productivity in Manufacturing Industries", in *International Labour Review*, Vol. LXVII, No. 4, Apr. 1953.

their own internal programmes. Indeed, in the more developed areas, these internal programmes are excellent examples of sound training methods.

However, to encourage and assist local enterprises to undertake this vital work, a supervisory training centre is needed. Furthermore, such a centre could be extremely helpful in enabling smaller organisations to carry on jointly a programme of supervisory development that no one of them could afford by itself.

Among the functions of such a centre, would be—

(a) research into the function of the supervisor in small and large organisations ;

(b) action as a co-ordinating agency between existing educational institutions and industrial enterprises in the training of foremen ;

(c) the selection, training and supervision of supervisory trainers ;

(d) the development of training material for trainers and supervisors.

Training of Specialists.

In the more advanced areas there has been a striking increase in the use of specialists of all kinds. This has come about not so much by the increased size of many undertakings as by the rapid discovery of new information in a great variety of scientific fields and the ever-increasing rate of application of such information to the every-day problems of industrial life.

In underdeveloped areas the lack of competent specialists is an acute handicap to the improvement of productivity in a large number of firms. Unfortunately there is often a vicious circle, since many firms are unaware of the potential contribution that a specialist could make because no training centre exists in this field, while on the other hand no training centre exists because local firms have not demanded the services of such specialists. In order to break this pattern it is necessary to establish (or bolster up, where such activities have already made a beginning) training centres and research in the fields of cost accounting, design, industrial and applied psychology, industrial engineering, applied statistics and marketing.

Only the larger industrial organisations will be able to afford the services of a full-time specialist in each of these fields. However, the need in smaller organisations will be at least as acute. It is therefore necessary that such centres assume the responsibility for the training and guidance of small-company personnel, in view

of the importance of the small organisations, which usually represent the bulk of the economic effort.

Training of Management.

There is little doubt that the key people in a national productivity programme are the country's managers. As J. J. Spengler pointed out :

> Industrial progress is markedly dependent upon *(a)* the relative number of imaginative and energetic innovators and entrepreneurs present in the population, *(b)* the extent to which these qualified persons are empowered to make and execute relevant decisions, and *(c)* the degree to which these individuals are free of hampering legal and institutional arrangements.[1]

To these three points a fourth must be added in the case of underdeveloped areas : the degree to which facilities exist for the training of local managers in modern management methods. For it is clear that if managers in underdeveloped areas (or, for that matter, anywhere) are to conform to what is required of them in a national productivity programme, they must be taught both the necessity for doing so and the methods by which it can be done. In order to realise this objective, a management training centre is needed. The functions of such a training centre should be—

(a) the development of training materials for management education programmes ;

(b) the selection and training of trainers. This is of special importance, since the methods of training people of executive level are necessarily different from those used in supervisory or specialist training ;

(c) carrying out the management training ;

(d) acting as a centre for the local and international exchange of information related to management problems.

The rapid growth of such centres in the United States and Western Europe during the last decade is an interesting indication of the service that such units perform in the attempt to raise productivity.

Motivation

Vital as selection and training are to the productivity effort, they are of little avail if the workers lack the will to acquire the skills presented and to use them to their fullest capacity. Unless people want to go in the direction required by economic develop-

[1] As quoted by Ragnar NURKSE in *Problems of Capital Formation in Underdeveloped Countries* (Oxford, Basil Blackwell, 1953), p. 17.

ment, it is clear that such development will be very difficult to reconcile with personal satisfaction.

The problem of motivation may be divided into two subsidiary problems : how to induce willingness to devote one's energies to the existing methods of work and how to induce willingness to adapt to changing methods of working and living. The solution of both problems depends on a fundamental knowledge of group habits and values.

Unfortunately the general faith placed in financial inducements often tends to overlook deeper and more powerful appeals. In Israel, for example, the most striking diligence may be observed among the collective settlements, which are in most cases practically moneyless societies. In view of what has been known since the Hawthorne experiments[1], this should not be surprising. However, the principles discovered in these experiments have not been systematically applied in all underdeveloped areas.

Any attempt to raise productivity implies a change in the existing method of doing things, and change—as has been constantly reiterated by the social psychologists—represents a most jarring challenge to the existing order of personal relationships. It is very important for economic progress that this challenge be met successfully. In this case success would mean that the changes required in order to improve productivity are accepted as improvements by the workers involved and that the source of initiative for the change (the productivity centre or the industrial engineer) is accepted as generally beneficial.

To achieve these requirements, a considerable knowledge of group attitudes is required. This is especially important in underdeveloped areas, since there the existing group values may be quite different from those with which those instigating the changes are familiar, and the violation of these values may immediately destroy all hope of introducing programmes of even the soundest technical value.

For these reasons it is important that there should be a centre for social research to assist the productivity programme. The centre should have among its functions research into group habits and attitudes among all sectors of the working population and training in group dynamics and human relations for all persons concerned with the introduction of change in the working environment. This would include managers, supervisors, engineers, and especially the staff of a productivity centre.

[1] Experiments carried out by the Western Electric Company in the United States at its Hawthorne works in Chicago concerning the effect on output of various changes in working conditions. See F. J. ROETHLISBERGER and William J. DICKSON : *Management and the Worker* (Cambridge, Mass., Harvard University Press, 1939) and Elton MAYO : *The Human Problems of an Industrial Civilisation* (Second edition, Boston, Mass., 1946).

Safety

Measures to promote greater safety in industry may also make an important contribution to the more efficient utilisation of all types of resources. In underdeveloped areas the combination of new and unfamiliar working methods and equipment frequently results in an extremely high accident rate, death or injuries to personnel, damage to equipment and waste of materials.

One of the essentials of an accident prevention programme is undoubtedly adequate labour legislation and an inspectorate that ensures compliance with minimum standards. However, this is by no means the complete answer. If real safety is to be achieved, all workers must be trained in methods of locating and removing causes of accidents. For this a national safety organisation is required, with educational and advisory rather than coercive functions. Such organisations are admirably typified in the National Safety Council in the United States and the E.N.P.I.[1] in Italy.

The functions of a national safety organisation should be training those who will train the workers and also training management in the importance of safety, establishing standards for safe practices and equipment, acting as a central agency for the distribution of information on safety and drawing up public information programmes.

Improved Utilisation of Equipment

The most important techniques in this category of interest to individual enterprises are the selection or design of new equipment and maintenance.

Both of these techniques deserve special priority in the repertoire of productivity techniques to be applied in underdeveloped areas, since both have as their primary objective the conservation of investment capital. A poorly chosen machine or one that is allowed to wear out before its time represents a waste of capital—one of the scarcest resources of an underdeveloped area.

The Selection of New Equipment

In highly industrialised areas, the manager faced with the problem of selecting a new machine has a relatively straightforward problem. If the cost of the new machine justifies it, he will entrust to his cost accountant the task of making an analysis of several alternatives and to the chief engineer or equipment salesmen the task of making a technical comparison between the various types and models available. His own experience will, in the final analysis, prevent any serious mistakes when the choice is made.

[1] Ente Nazionale di Propaganda per la Prevenzione degli Infortuni.

In an underdeveloped area, none of these factors may be present. The frequent lack of competent specialists within the organisation makes it difficult to undertake the type of investigation required for a rational choice. The long distance from the suppliers may make it difficult to deal with a sales representative of the same calibre as is available in the home market. Furthermore, trade agreements or delivery considerations may make it essential to purchase from firms with whom the organisation has no experience at all. In view of these difficulties, which are especially acute for smaller firms, an equipment advisory centre is necessary in underdeveloped areas.

The function of such a centre is to accumulate detailed information concerning the characteristics and cost of equipment available in specific industries and to assist local enterprises to make a selection by undertaking studies of their needs and advising them on available equipment.

An interesting illustration of the potential contribution of such an organisation was provided by the Productivity Institute of Israel recently. To import equipment into Israel, an import licence is required. A review of the requests made for such licences and visits to the factories desiring them showed that neither in the factories concerned nor in the governmental agencies were there specialists available to undertake a detailed investigation. Engineers of the Institute were sent to enterprises making requests, in order to advise them on how the increased production could be obtained without the use of new equipment or to show how less costly equipment would be more suitable to the needs of the specific case. In some cases enterprises had underestimated their capital requirements but, by and large, the savings effected were quite impressive.

Maintenance

One of the most noticeable wastes of vital capital resources in an underdeveloped area arises from failure to maintain expensive equipment properly. The resulting rapid deterioration of machinery is particularly extravagant in view of the difficulty of recovering invested capital in such areas.

A necessary institution to help overcome this situation is a central agency to advise on the necessary procedure for proper maintenance. Such an agency will include among its responsibilities (1) the development of training courses in maintenance for all levels of operating personnel—not only the specialists who have to do the repairs but also the workers and supervisors who must carry out the procedure required to minimise breakdowns; (2) contact with suppliers and manufacturers of equipment to ensure

the availability of maintenance materials; (3) publicity programmes to ensure proper treatment of the equipment used.

Improved Utilisation of Materials

The effective utilisation of materials within the enterprise depends to a very great extent upon two groups of specialists—research personnel and designers.

From the long-range point of view, the contribution of research personnel to a programme for the better utilisation of material is probably the more important. The problem of finding substitute materials that can be produced locally, or at lower cost than those being used, is a fundamental one. However, the enormous problem of the relationship between the scientific facilities of a nation and its productivity programme deserves a far more extensive and detailed analysis than is possible here. Within the individual enterprise, the responsibility for material utilisation frequently falls upon the designer.

The designer is responsible for applying the scientific knowledge of materials to the specific problem of the product to be made. He must specify the kinds of material to be used, determine the amounts of materials necessary and indicate the form of the product, in order to integrate in the best way the properties of the materials chosen with the function to be fulfilled.

To do these successfully, the designer requires a vast knowledge of materials, processes and costs. It is impossible for an individual to build up this knowledge by means of personal experience. It is essential for him to have access to a centre that can accumulate and disseminate the data needed. Specifically, the functions of such a centre should include the provision of information concerning relative costs of material, new developments in design, and the standardisation of products and components.

Industrial Engineering

In recent years there has been a great development in a set of techniques that may be broadly grouped under the title of industrial engineering.

The techniques in this category differ from those previously listed in that they do not primarily refer to only one of the factors mentioned. Rather, they may be applied to the whole enterprise. They are techniques for describing, analysing and diagnosing. Therein lies their special contribution, for frequently one of the difficulties in attempting to raise productivity in an enterprise is to describe adequately the existing situation, and decide which

of the three factors (manpower, equipment, or materials) is the major source of trouble.

These techniques are as follows :

(a) methods improvement (finding a better way to do the job) ;

(b) work measurement (deciding how long the job should take) ;

(c) quality control (deciding how good the product should be and how good it is) ;

(d) factory layout (determining the best distribution of machinery and related equipment) ;

(e) production planning and control (deciding what, when and how production should take place, to what extent the programme is being adhered to and what action should be taken) ;

(f) organisation (determining the scope and inter-relationship of the jobs in the enterprise).

The application of all these techniques is a very powerful means of improving the productivity of the enterprise. If they are fully understood and used at all levels, they can bring about considerable savings. Consequently a centre for their promulgation is an important addition to the organisations previously listed. The functions of such a centre should be to educate all levels of the organisation in the use of these techniques, to act as a centre of documentation and exchange of information and to co-operate with existing institutions in order to foster the introduction of such subjects into their curricula.

Study of Markets

Not less important than the above is a careful study of markets, actual and prospective, so as to ensure that the firm's products are as well adapted as possible, in range and quality, to consumers' requirements. Blind faith rather than the facts of the market too often determine decisions to establish a factory or manufacture a new product. It is therefore convenient to have a marketing centre, which would have among its functions advice on methods of undertaking market surveys and the training of specialists in market research techniques.

Summary of Organisations Required

In accordance with the recommendations outlined above, the implementation of a national productivity programme in an underdeveloped area requires organisations that can handle, separately or in combination, the functions of—

(a) a central statistical office ;

(b) a centre for job analysis and description ;

(c) a psychological testing centre ;

(d) a supervisory training centre ;

(e) a specialist training centre for cost accounting, design, industrial and applied psychology, applied statistics and marketing;

(f) a management training centre ;

(g) a centre for research and education in the field of motivation ;

(h) a national safety institute ;

(i) a centre to advise in the selection of equipment ;

(j) a maintenance centre ;

(k) a centre for industrial engineering techniques.

This listing is not intended to imply that each of the organisations mentioned should be separate or that they should be established in addition to such as may already exist. Whether or not such centres should be completely independent of each other or how they should be grouped together is something to be solved by the local authorities, taking into account the personnel available. For example, an equipment selection advisory centre might very well be combined with a maintenance centre, a management training centre with a centre for industrial engineering techniques and with the specialist training centres mentioned under *(e)*.

Method of Establishing the Organisations Required

It will seldom be possible in an underdeveloped country to initiate or develop activities along all these lines simultaneously, and decisions regarding priorities will have to be taken, with due regard to local facilities as well as needs. In a country with few or no existing facilities on which to build, the first task may be a survey of needs, undertaken perhaps by a small technical assistance mission. This may be followed by the establishment of a single productivity centre with, at first, a relatively narrow range of activities, which could be gradually expanded to cover all or most of the various activities mentioned ; the establishment of more specialised centres may come later. In any event, in view of the wide range of activities to be initiated, the best method of ensuring integrated action is to establish first a nucleus under the leadership of a director of the highest standing and competence, perhaps of ministerial level. The nucleus may take the form of a national productivity centre or institute such as has been established in a number of European countries and in Egypt, India and Israel.

Experience has shown that it is desirable to associate representatives of employers and workers with the work of such a centre.

The potential activities of such a small but influential nerve centre are extremely important. Among them might be included the following :

1. A survey of existing facilities in each of the fields mentioned. In most countries a start has already been made in some, and it is both wasteful and damaging to the prospects of co-operative effort to overlook the possibility of using existing institutions. Universities, technical institutions and voluntary professional associations such as institutes of management are among the bodies whose facilities it may be possible to expand and develop.

2. Where the local situation is found lacking, to encourage the establishment of new facilities. The success of the nucleus should be judged by the extent to which it is able to encourage other institutions to adapt their facilities to the requirements of the national productivity programme.

3. To act as a single, centralised source of information on facilities existing in the country. Very frequently existing facilities are not sufficiently utilised because they are not known to the persons requiring the service.

4. To act as a liaison between those concerned with economic planning and those concerned with productivity. The fullest application of productivity techniques to expanding industries can have only beneficial effects for all concerned. It is the industries at present suffering from overexpansion or underconsumption that present the truly difficult productivity problems. To select the industries or enterprises that are to have priority in the productivity programme requires close collaboration with economic planning. This is best achieved through such a centre.

5. To act as a means of co-ordinating local agencies in order to obtain effective action on selected problems. Once a specific industry or enterprise has been selected for priority treatment, the best results are achieved by the unified efforts of all types of centre. To achieve this co-ordination of effort a central policy, making nucleus is essential.

Conclusion

In his book on the problems of capital formation in underdeveloped countries, Professor Nurkse has written :

> Leaving aside the engineering aspect of capital formation, we shall proceed on the assumption—a quite realistic assumption for the less devel-

oped countries—that there is a great fund of technical knowledge in the world which could be advantageously applied to the productive process if only economic resources were available to make use of it.

Experience would appear to indicate that, even where such economic resources are available, the application of such technical knowledge is by no means automatic. This article has attempted to show the organisational framework necessary to facilitate the introduction of such technical knowledge into the field of productivity.

The Aims of Mexico's Indian Policy

by

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After many years' study of the social and economic problems facing indigenous peoples, the International Labour Organisation will consider, at the 39th Session of the Conference in June 1956, the question of the living and working conditions of indigenous populations in independent countries, with a view to the adoption of an international instrument containing general provisions for the protection and integration of these peoples, based on the previous work of the Organisation itself and on the outcome of consultations with other international organisations.[1] *Particular interest therefore attaches to the following exposition of the principles that have long inspired Mexico's Indian policy, and which have been reaffirmed and developed further by the National Indian Institute. In 1948, when the Institute was founded, Mexico had already squarely faced many of the problems of the Indian communities and had set up several government services, which, notably from 1934 onwards, had responsibility in a number of matters, from agrarian reform to the building of schools and roads, under successive governments. The National Indian Institute supplements the work of the Department of Indian*

[1] See I.L.O. : *Living and Working Conditions of Indigenous Populations in Independent Countries*, Report VIII (1), International Labour Conference, 39th Session, 1956 (Geneva, 1955). This report was prepared in close collaboration with the United Nations, the F.A.O., U.N.E.S.C.O. and the W.H.O. The principal social and economic aspects of the Indian problem and the aims, scope and results of national and international action to integrate them are analysed in I.L.O. : *Indigenous Peoples : Living and Working Conditions of Aboriginal Populations in Independent Countries*, Studies and Reports, New Series, No. 35 (Geneva, 1953). See also the accounts of the first and second sessions of the I.L.O. Committee of Experts on Indigenous Labour (*International Labour Review*, Vol. LXIV, No. 1, July 1951 and Vol. LXX, No. 5, Nov. 1954). Concerning international technical assistance to promote the integration of indigenous peoples, reference should be made to the article of Ernest BEAGLEHOLE : " A Technical Assistance Mission in the Andes " (idem, Vol. LXVII, No. 6, June 1953).

Affairs. It is a semi-autonomous body responsible for promoting the integration of the Indian population and co-ordinating the work of the governmental bodies competent in Indian affairs.[1]

THE Indian question is of vital importance to Mexico. In a population of 28 million inhabitants 3 million persons speak an Indian language only or, if they speak Spanish as well, are not really at home in it. If the criterion of language alone is taken, the Indian problem in Mexico affects over 10 per cent. of the country's total population.[2]

For the National Indian Institute the problem of deciding who is an Indian and who is not, in accordance with theoretical criteria, has given way to the similar but by no means identical problem of deciding who should be covered by the federal Government's Indian policy. In 1948 I pointed out that this problem does not really concern the individual, and suggested that instead of trying to define an Indian we should tackle a question of far greater practical interest, viz. the problem of the Indian community.[3] We set out to list a series of characteristics that marked off the Indian community from the Mexican village, though we noted at the same time that these characteristics were slowly disappearing as changes took place in the former. In some cases the changes were the outcome of ordinary contacts with the rest of the population ; in others they were due to government action.

The progress made by the National Indian Institute since 1948 has enabled us to take a further step forward. Nowadays we speak of Indian areas rather than Indian communities, i.e. areas, varying in size, composed of a number of Indian (or Indian and mixed) communities and which centre, economically, culturally, socially

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[1] For further information concerning the work of the National Indian Institute, see *Indigenous Peoples*, op. cit., pp. 507-509, and *Qué es el I.N.I. ?* and other publications of the Institute; notes on the latter appear under " Bibliography " in this issue of the *Review*.

[2] For an account of the different and often conflicting criteria for defining such differences as may exist between the indigenous people and the remainder of the population, see *Indigenous Peoples*, op. cit., pp. 1-27.

[3] " An Indian is a person who feels that he belongs to an indigenous community. An indigenous community is one in which non-European physical characteristics predominate ; in which an indigenous language is spoken for preference; in which the material and spiritual culture contains a large proportion of indigenous elements ; lastly, it is a community with a joint consciousness of common isolation among the other surrounding communities, which makes it feel distinct from the white and mixed peoples." (Alfonso CASO : " Definición del indio y lo indio ", in *América Indígena* (Inter-American Indian Institute, Mexico City), Vol. VIII, No. 4, Oct. 1948, p. 246.)

and politically, round a town of mixed population, which we term the capital of the Indian area.

Examples of this are to be found at Tlaxiaco, in relation to the surrounding Upper Mixtec area, in the State of Oaxaca, or at San Cristóbal las Casas, in relation to the Tzeltal-Tzotzil area of Chiapas state. The influence of these capitals, with their mixed populations, is naturally felt most strongly in those communities enjoying the best communications with them, and is proportionately weaker in the more distant or inaccessible communities.

On the other hand the Indian communities themselves exercise a definite influence on the capital and give it a stamp that is not found in any of the other mixed towns of Mexico. This interplay is far-reaching in its effects, and in fact the capital of any Indian area would be unable to live without its surrounding communities, from which it draws the materials needed to maintain life, trade and such industry (usually handicrafts) as it possesses. The communities, for their part, could not live without the capital, which the Indians visit in order to exchange their own surplus products for such articles as they do not produce but need either for day-to-day use (salt, sugar, thread and paraffin) or for special occasions (fireworks, candles and brandy).

This interdependence of community and capital in each area makes it inevitable that the federal Government should take the local capital as a base for its activities and use it as the headquarters of its Indian co-ordination centre.[1]

The aim of our policy towards the Indian is neither to preserve the traditional cultural forms of the Indian community nor, on the other hand, to prevent the community from becoming " contaminated " by mestizo or European influences. Still less is it to force the Indian communities back to the traditional life they led in the past. Our final and unequivocal objective is to hasten the evolution of the Indian community so as to integrate it as speedily as possible—without disorganising it—into the economic, cultural and political life of Mexico. In other words our aim is to hasten the change, which is in any case inevitable, whereby the Indian community can develop into a normal Mexican village and the Indian area can acquire the same characteristics as the remainder

[1] The National Indian Institute co-ordinates the Government's Indian policy through four " co-ordinating centres " situated in the Tzeltal-Tzotzil area of Chiapas state, the Tarahumara area of Chihuahua, the Mazatec and Chinantec area of Oaxaca State (in the Papaloapan basin) and the Mixtec area in the north and south of the same state. The oldest of the centres is that set up in the Tzeltal-Tzotzil area in 1950. The centres bear full responsibility for all economic, educational and health aspects of the incorporation of the Indian communities in their respective areas into the national community.

of Mexico. This need not by any means involve the destruction of the positive aspects of Indian culture that have survived, such as the identification of the individual with his community, the wearing of local costumes and the manufacture of artistic products, all of which should be preserved and encouraged. But it is useless to retain old ideas about the causes of natural phenomena and the best ways of making use of natural forces ; it would be futile and even harmful to cling to traditional ideas about the causes and cure of disease or to preserve backward, unscientific techniques of farming, forestry, stockraising, poultry breeding, etc. For these reasons, then, the aim of the National Indian Institute is to convert the Indian community into a Mexican community.

Any culture is a faithful reflection of the life of a community. It is the product of the ways the community has adopted of solving its economic problems, maintaining life, perpetuating its own existence and safeguarding itself against both internal and external forces, and this community life has, in the long run, given rise to certain cultural forms. In short, the pattern of a community's culture is determined by the nature of its physical environment and the persons who live together within it.

In any culture, as in any life, a balance must be struck, and any change in one of its aspects is bound to have repercussions on the others, which may appear to be quite unrelated but in fact go to make up the balance that exists in any culture. Accordingly, in any attempt to transform an Indian community so as to hasten its integration into the life of the country, it is essential to tackle the cultural problem as a whole rather than any one of its aspects alone. Any effort along these lines must therefore be comprehensive, i.e., it must deal with economics, health and education in the widest sense, so that the Indians are not only taught to read and write the national language but are given instruction in suitable farming and manufacturing techniques. This comprehensive approach naturally requires co-ordination of the work of those responsible for carrying it out. Economists, agronomists, experts on forestry, poultry breeding, bee-keeping and arts and crafts, doctors, sanitary engineers, social workers and educationalists of all kinds have an important part to play in transforming the community. But the practical work of these experts must fit into the pattern laid down by the social anthropologist, for at bottom the problem is not one of economics, health or education, but of cultural change ; it is, in other words, an anthropological problem.

If we are to make a success of this integration we must first decide on the approach to be made to the Indian community. There are three possible approaches, involving three different courses of action.

The first, which may be termed the purely scientific approach, is concerned with the study of the culture of the community without considering whether or not it is equal to the demands of the modern age. An effort is made to study the community with complete objectivity, just as a zoologist or a botanist studies an animal or plant specimen. Those who take this as their aim when confronted with an Indian community will unquestionably try to study it as it is and not as it ought to be and will be in favour of isolating the community in order to prevent it from being "contaminated" and thereby losing the characteristic features of Indian life. Along with this attempt to understand the cultural forces at work in a community may be mentioned also the distinctly less worthy approach of those who see only the picturesque aspects and try to preserve them as an interesting spectacle.

The second approach consists of looking upon the Indian community as made up of individuals practising a set of customs which, from the Western point of view, should be abolished, in the first place because they are not Western customs and in the second place because they are held to be in some degree immoral in that, among other objections, they conflict with established patterns of family organisation, religious worship and political life. Judged from this standpoint, the Indian community appears as an evil to be stamped out as quickly as possible and with the utmost thoroughness. This approach inevitably entails the use of compulsion. If an Indian community refuses to abandon its lands because it is strongly attached to them even though they are very poor—as is the case with the Otomí Indians of the Mezquital valley—it is argued that force can justifiably be used to shift the Indians from their present territories to others where life would be easier. Even when the general idea behind this approach is a generous one, it shows, both in theory and practice, not only a complete ignorance of the teachings of social science but the conscious or unconscious stamp of the colonial mentality. It leads to the belief that the problem is due to the fact that the individuals concerned are rooted in evil and must be saved even against their own will. This approach is a fanatical and tyrannical one. Today it can surely be held only by those who have no experience of social problems.

The third approach, which is that of the Indian Institute, is to recognise that the Indian communities in their present form are the product of a variety of historical and social factors, which have enabled them to survive and maintain their cultural patterns (whether good or bad from our point of view), but that they now require, in their own as well as the national interest, to be integrated in the life of the country by a process of gradual change.

In practice, this approach must go further than pure investigation, while stopping far short of compulsion. It must be a combination of study and action and fundamentally educational in the broadest sense of the term. This means that it must work through persuasion and the force of example. For instance, the inhabitants of a village will not be ordered to use the plough, but will be shown that if they do they will obtain better crops. There will be no persecution of an individual because he makes offerings to the gods of the mountains for rain to fall on his crops. Instead, dams and irrigation canals will be built to provide a constant supply of water and prove that there are more effective ways of improving crops.

As regards legislation there are three approaches towards the Indian population. The first, or liberal approach, consists in declaring that all citizens are equal before the law and that, as a result, the Indian communities and their inhabitants have the same rights and duties as any other citizens. This is unquestionably a generous attitude, but it is unrealistic. Where there is real, inescapable inequality between individuals, any law that introduces equality also introduces injustice. For example, on the statute book of every country there are enactments for the protection of minors, women and workers because it is considered that in the economic and social struggle these members of society are less able to defend themselves than adults, men or employers, and the State, instead of remaining indifferent to the inevitable conflicts, has a duty to protect the weak.

The second approach, which appears to us of equally dubious value, is to regard the Indian communities as permanently condemned to backwardness compared with other communities or their own local capitals. This approach would result in protective legislation that would at all times treat the Indians as minors and prevent them from exercising the same rights as other citizens.

In our view the right approach should take the form of government action designed to set the Indian community on its feet by providing it with the technical resources it needs to maintain and safeguard its existence. One of these methods, perhaps the most effective, is to teach the national language in which legislation is drafted, dealings with the authorities are conducted, and contracts between individuals are concluded. In this way the Indian can be helped not only to acquire an elementary education but also to make constant progress in the path of culture. Another method is to build roads to provide rapid communication with other communities and cities of the country, for a road opens the way not only for the movement of goods but also, and more important, for the movement of ideas. Yet another method is to give

the Indian communities technical training to enable them to form producers' and consumers' associations, together with credit associations, and thereby put a stop to the heartless exploitation of their backwardness and ignorance.

Government action should thus be designed not only to give protection but also to achieve cultural change, without, however, producing any dislocation or tension that might lead to a breakdown in family or community life.

It should be borne in mind that action in any Indian community must have the Indians' interests at heart. Any attempt to exploit the land, timber, water supplies or subsoil of a community, however over-riding the national interest may be, must always place the community's interests first. That is why we believe it essential to enlist the co-operation of the Indians themselves and to take no step until those who will benefit by it are willing to accept the aid offered to them, in the knowledge that it is not something imposed by more powerful groups or by the State, but a beneficial change carried out with their participation.

This is the approach of the Mexican National Institute towards its work among the country's Indian communities.

REPORTS AND INQUIRIES

Wage Differentials Affecting Young Workers

The following article analyses certain conditions that have contributed to the depression of young workers' wages, examines the extent and character of the wage differentials now applied to the work of young persons in a number of countries and discusses attempts that have been made to obtain a redefinition of the wage-earning status of young workers.

Juvenile labour has traditionally been assessed in terms of low economic value. In pre-industrial and highly industrial societies alike, the wage rate for young workers is generally well below the rate for unskilled adult earners in the same occupational group. In the past physical development was an important labour qualification that influenced wages considerably, though there is evidence that the demarcation between "adult" and "youth" was very flexible, so that the age at which a young person was deemed capable of earning adult rates might be as low as 12 or 14 years. Today, under conditions of progressive mechanisation, when the measurement of potential productivity is relatively seldom made in terms of adult physical development and stamina, young workers frequently earn sub-minimum rates for comparable work until they are 18 or 20 years of age or even older.

Reasons Adduced for the Low Wages of Young Workers

The arguments most frequently put forward to explain the present unfavourable status of the young wage earner are his lack of previous training or practical experience, his limited efficiency in employment, legal requirements restricting his general utility within an undertaking, and high occupational mobility. These arguments, which in certain circumstances may serve as grounds for using the juvenile labour force as a source of cheap labour, are examined below.

Lack of Training

When recruiting a juvenile, the employer will assign him either to a job of low productivity in which, generally speaking, no special facilities are offered for learning the broader aspects of the trade, or to a learner's or apprentice's post, which, for some time at least, will

be characterised by a lower rate of productivity than that normal for a fully experienced worker. In these cases the employer is justified in offering proportionately lower wage rates. On the other hand jobs of low productivity, as well as learners' posts, offer higher wages for adults than for young workers; it would therefore appear that young workers are paid lower wages not only for reasons of relative lack of skill and experience but also on account of an arbitrary qualification based on age, which is used both as a method of reducing costs and as a psychological weapon creating an artificially higher status for older workers in the same employment category.

The employment of untrained juvenile labour at sub-minimum rates of pay is sometimes of appreciable financial advantage to the employer. This is in some instances indicated by the large numbers of young persons employed in certain industries, and also by the practice in some undertakings of systematically dismissing young workers when they reach an age entitling them to adult rates of pay. In 1938 the Employment Council in New South Wales (Australia) noted that—

> many industries employ so considerable a proportion of youth labour in ratio to adult labour that a large number of the youths have no prospect of continued employment in the same industry as adults... [and that] in consequence many youths annually lose their employment at the age of 21 (or earlier) to be replaced by juniors. These young men must then... find openings in other industries, which they can enter as adults without skill, or... drift into the already saturated market for general unskilled labour—or become chronically unemployed.[1]

In France it has been claimed recently that some employers in the dressmaking trades reject young workers who possess the qualifications that would entitle them to the wages paid to skilled workers. They seek instead to recruit untrained girls aged between 14 and 16 years for long-term training on the job, with low wages.[2]

The influence of the age factor in reducing the cost of the employer's product can, however, be seen in its most extreme form at the level of skilled employment, where recruitment requirements are sometimes expressed in terms of both qualification and age, such as " stitchers for knitwear under the age of 16 years " or " embroideresses under the age of 20 years ".

Limited Efficiency

New entrants into occupational life are indeed faced with a number of important readjustments in routine and discipline that may, for a period, affect the quality and quantity of their work. Except in rare cases, however, acclimatisation does not take long, and is today accelerated by the increasing use of welfare officers in industry or of such methods as the " adjustment to industry " courses organised by the National Association of Boys' Clubs in the United Kingdom.[3] An interesting innovation in some recent collective agreements is the insertion of a provision limiting the payment of sub-minimum beginners' rates to a given number of days or weeks.

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[1] Legislative Assembly, New South Wales, Employment Council: *Reports and Recommendations* (Sydney, 24 Aug. 1939).

[2] *Liaisons Sociales*, supplement to *La Revue de Presse*, 27 Apr. 1953.

[3] Ministry of Labour and National Service: *Report of the National Youth Employment Council on the Work of the Youth Employment Service* (London, H.M. Stationery Office, 1953).

Legal Requirements

Legal requirements designed to ensure the protection of the young worker are also used as arguments for lowering basic rates of remuneration. It is claimed, for example, that extra charges incurred through pre-employment and periodic medical examinations, the deduction from working hours of time for further education and the limitation of hours of work reduce the value of the young worker to the undertaking.

Occupational Mobility

One reason for frequent changes of job among young workers is that the first job is often chosen haphazardly through personal contacts and without reference to vocational guidance or employment agencies.[1] In other cases the impetus towards change of employment is motivated by the simple desire to experiment with various types of work ; this is, of course, particularly strong wherever the incentive of higher earnings, improved social prestige or more attractive fringe benefits is present. It has been estimated by W. S. Woytinsky that in the United States young persons are seldom in employment on a regular basis before the age of 20 years.[2]

To a certain degree, therefore, it is inevitable that the employment of young workers should assume some of the characteristics of casual labour on the employment market. The employer is predisposed to consider all recruitment of juveniles, with the exception of apprentices, as short-term appointments, and therefore tends to regard the juvenile labour force as a form of marginal labour to be recruited when production is at a high level and to be dismissed as soon as production declines. In the United States, for example, almost all male seasonal workers during the years 1946-50 were young workers in the age group between 14 and 24 years.[3]

Other Influences on Young Workers' Wages

Business Fluctuations

Even in periods of economic stability juvenile labour reveals the weaknesses inherent in any marginal labour force, since only at comparatively rare periods is the demand for young workers sufficient to absorb the supply of recruits. W. S. Woytinsky [3] shows that in the United States high unemployment figures for young workers are characteristic of both " good times and bad " ; he points out that " in 1943, when 1.9 per cent. of all workers were unemployed, 4.4 per cent. of those under 20 had no jobs ; in 1940, when the unemployment rate was 14.6 per cent. for all workers, almost a third (31.4 per cent.) of the 14-19 age group were without work ".

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[1] Consultation with vocational guidance authorities may be expected to reduce high rates of turnover due to unsuitable employment. In 1950 a survey carried out in France showed that, while only 39.5 per cent. of young workers without vocational guidance expressed satisfaction with their jobs, 66.5 per cent. of those who had had guidance declared themselves fully satisfied.

[2] W. S. Woytinsky and associates : *Employment and Wages in the United States* (New York, 1953).

[3] *Employment and Wages in the United States*, op. cit.

Only where an economy is rapidly expanding, it appears, will competition between employers to secure the services of young workers fully absorb the available number of juveniles and, by setting higher wage incentives as a means of attracting personnel, in due course materially reduce such differentials as exist between young workers' and adults' wages.

While conditions of very high employment are therefore especially favourable to young workers in permitting almost unlimited job-opportunity on terms of approximately equal competition with adult workers, they do not lead to a permanent improvement in the status of young workers in the employment market. As soon as there is a recession, the younger age groups are the most vulnerable to retrenchment programmes. This condition is partly due to the general feeling that adults, who are likely to have family obligations, should be given higher priority in job tenure, and partly to the fact that, where conditions in any given enterprise are governed by the terms of a collective agreement, seniority values determining sequence of lay-off offer very meagre protection to the younger and most recently recruited employees. Consequently, where a large number of adolescents compete for a limited number of vacancies, the tendency will be for wages to drop to a level determined either by legal requirements—so that the minimum wage becomes in effect the only wage—or, where no wage minima have been established, to the level of the lowest wage that the individual worker can be induced to accept.

The general view in many countries appears to be that the young worker is always able to return to his dependent status within the family unit, and that successive periods of unemployment can be compensated through social security benefits such as family allowances or, to some extent, unemployment benefits. This view appears to have been adopted even in regions where the basis for financing young workers' unemployment barely exists.

Demographic Fluctuations

Demographic fluctuations have a direct bearing on the intensity of competition among juveniles themselves on the employment market, and consequently on the level of wages offered to young workers. Under conditions of severe competition among an unusually large group of young workers for a limited number of posts, it is evident that the employer will be in a strong bargaining position and will be able to choose his juvenile recruits from among those who combine average ability (or better) with sub-average wage demands.

In highly productive economies the general trend today seems to be to reduce potential competition among young workers by improved educational and training facilities and the extension of compulsory school attendance. In Switzerland, for example, it is expected that, as a result of the high birth rate between 1941 and 1949, an increasing number of young workers will enter the employment market between the years 1956 and 1964; the Swiss Association for the Vocational Guidance and Protection of Apprentices has consequently drawn up detailed proposals for the extension and improvement of apprentices' facilities and the institution of post-school training establishments for unskilled workers who do not propose to enter apprenticeship.

In countries with a lower standard of living, on the other hand, while there is little possibility of financing such a deflection from the

juvenile employment market, there is active economic pressure on young persons themselves to earn a living as soon as possible.

Conversely, the low birth rates in the thirties and the consequent shortage of young workers evident in some countries today (notably in the United Kingdom and in Scandinavia) have almost always been characterised by a steady upward trend both in the level of minimum wages for young workers and in inter-employer competitive offers above the level of minimum wage rates.

The Extent and Character of the Differentials

Minimum wage rates are generally determined by collective bargaining, legislation, wage boards enjoying powers delegated by legislation or industrial arbitration. Because of the variable element involved in all bargaining and discussion procedures, differentials based on age show little unity of structure or content.

In some instances a minimum flat rate is operative for all young persons. Provided that the young worker is under a stated age, the rate bears no relation to the question whether he is a newcomer to employment, to the duration and quality of his training and work experience, or to his occupational ability; his strict legal wage entitlement is no more at the age of, say, 17 years than at the age of 14. Another characteristic of the flat-rate system is that it is easily capable of adjustment independently of adult rates, so that increases in the latter—which are generally more frequent—may not be reflected proportionately or at all in the juvenile rate.

Typical wage patterns based on the principle of the flat-rate minimum wage are to be found, for example, in the wage legislation of Manitoba.[1] In this province all girls under the age of 18 years employed in factories receive the minimum wage of 48 cents an hour in cities and 45 cents in rural areas; all boys under the age of 18 years so employed are entitled to 48 cents an hour. Table I, which sets out daily rates (incorporating special allowances) in Ceylon as for May 1955 and as determined by a number of wage board decisions, also illustrates the application of the flat-rate wage system for young workers.

That such wage patterns do not necessarily reflect inferior working capacity or specially light work not ordinarily performed by adults

TABLE I. DAILY WAGE RATES, CEYLON, 1955

(Rupees)

Trade	Adults		Young persons [1]
	Male	Female	
Coconut growing	1.87	1.44	1.27
Coconut manufacturing:			
Colombo area	2.54	1.97	1.65
Outside Colombo area . . .	2.30	1.77	1.50
Building (unskilled)	2.57	2.33	2.13

Source: *Ceylon Labour Gazette*, May 1955.

[1] Under 18 years of age.

[1] Of the nine Canadian provinces that have minimum wage legislation, only Alberta and Manitoba make special provision for young workers.

may be seen in the differentials set by the Government of India (under powers defined by the Minimum Wages Act, 1948) in respect of road construction and building operations and stone breaking and stone crushing in the state of Delhi.[1] Although the employment of young workers in these trades is conditional upon their possession of a certificate of fitness to undertake the same work as is required of adults, the minimum rates payable to them fall well below the minimum rates for adult unskilled labour.

There is an increasing trend, however, to break down the flat-rate system in a way that distinguishes between the pre-adolescent and the adolescent elements in the juvenile labour force. In Argentina young workers between the ages of 16 and 18 years are entitled to at least 70 per cent., and those between the ages of 14 and 16 years to 50 per cent., of the wages of an unskilled labourer.[2] In Chile the adult minimum wage for agricultural workers may be reduced by 25 per cent. in the case of young workers between 15 and 18 years of age and by 40 per cent. in the case of young workers under 15 years of age.[3] In Delhi the minimum wage rates for certain industries also conform to this principle.[4]

By far the most prevalent practice, however, is to establish wage-for-age scales that define the wage entitlement year by year of every age group in the juvenile labour force on an annually increasing basis. Such progressive scales not only express some recognition of experience gained but also have considerable incentive value in restricting turnover. In the United Kingdom such automatic increments operate frequently until young workers attain the age of 20 years, adult minimum rates becoming payable at the age of 21 years. Table II, showing a number of United Kingdom industries in which hours of work are roughly comparable for juveniles and adults, illustrates this practice.

In some cases the wage-for-age rates for young workers may vary within the same industry and the same undertaking according to the type of work the young person is called upon to perform. In the Netherlands, for example, occupations in the petroleum industry are classified in nine grades, each grade having its own wage-for-age scale. The precedence of age over occupational qualifications is clearly seen in a comparison of these scales in a single industry: for example, a young man aged 24 years in the lowest occupational grade will nevertheless earn more than his colleague of 21 years employed in the most responsible grade.

Progressive wage increases in some industries may be made at two-yearly intervals. In other cases the incremental period is fixed at half-yearly intervals. In the coal-mining industry in the United Kingdom, for example, boys receive increments every six months until they reach the age of 18 years, when the incremental period is altered to an annual basis, the amount of each increment then being, however, more than twice the sum of the six-monthly increases. Other examples of half-yearly increases may be found in the cement industry in Belgium and in an industrial agreement concluded in 1954 between the Printing

[1] Notification No. LWI, 24 (74), 18 Mar. 1952.

[2] See Decree No. 32412 to prescribe the rights of young persons between 14 and 18 years of age who are employed in industrial workshops and establishments, 14 Dec. 1945.

[3] Decree No. 244 to make provision for the fixing of minimum wages for agricultural workers, 23 July 1953 (*I.L.O. Legislative Series*, 1953 (Chil. 3)).

[4] *Indian Labour Gazette*, Jan. 1955.

TABLE II. WEEKLY WAGE RATES OF YOUNG WORKERS IN SOME INDUSTRIES IN THE UNITED KINGDOM

Age	Industry		
	Biscuit manufacture	Paint, varnish and lacquer manufacture [1]	Electric cable manufacture
Males :			
15	52s.	43s. 6d.	51s. 4d.
16	61s.	54s. 6d.	62s. 4d.
17	66s.	67s. 3d.	72s. 5d
18	91s.	82s. 3d.	93s. 6d.
19	99s.	97s. 6d.	105s. 5d.
20	107s.	115s. —	116s. 5d.
Adult [2]	130s.	135s. —	134s. 9d.[3]
Females :			
15	50s.	43s. 3d.	49s. 6d.
16	57s.	50s. 6d.	60s. 6d.
17	61s.	60s. —	69s. 8d.
18	84s.	69s. —	adult rates
19	86s.	78s. —	
20	88s.	84s. 3d.	
Adult [2]	92s.	90s. —	99s. 11d.

Source : *Time Rates of Wages and Hours of Labour, 1 April 1955* (London, H.M.Stationery Office, 1955).

[1] Except London Metropolitan Police District.
[2] Lowest grade.
[3] Rate for eight counties.

Industry Employees' Union of Australia (New South Wales Branch) and Hygienic Containers Pty., Ltd.

While the general principle underlying all wage-for-age scales is the same, there is in practice considerable variation in pattern. In the first place the age of eligibility for adult rates is variously defined in the various industries. If any generalisation be attempted, it may be said that, while in other wage systems, such as the flat-rate system, eligibility for adult rates may vary from 16 years (as in the tea, rubber and coconut estates in Ceylon) to 21 years (as in many of the rates set under the Indian Minimum Wage Act, 1948 [1]), it would appear that most wage-for-age scales tend to postpone the age of eligibility for adult rates until the early 20s. In Italy young workers usually earn adult wages at the age of 20 years ; in Australia, Belgium and the United Kingdom, at the age of 21. Exceptions exist even in these countries, however : in the United Kingdom, in the retail co-operative societies, payment of the adult rate is postponed until the age of 23 years, and in the retail food trade, the retail meat trade and the retail drapery, outfitting and footwear trades adult rates are postponed until the age of 24 years.[2]

The progressive scale is, however, sometimes applied even after young workers have achieved adult wage-earning status : in New South Wales, for example, the warehouse employees' (state) award [3] establishes

[1] For example in respect of the ports of Madras and Bombay.
[2] *Time Rates of Wages and Hours of Labour*, op. cit.
[3] *New South Wales Industrial Gazette*, Sep. 1954.

the weekly basic wage for men at £12 3s.0d. and for women at £9 2s.0d., and at the same time provides that its wage-for-age scales should continue to apply until young men and women earn a weekly minimum of £14 1s.0d. and £9 16s.0d. respectively at the age of 23 years or over. This award includes a proviso subjecting wage-for-age rates to a 20 per cent. deduction in the case of boys and girls entering the trade between the ages of 18 and 21 years.

While wage-for-age and other rates are designed to establish minimum rather than standard rates—so that in principle a young worker of exceptional talent and application should be capable of higher earnings—in practice wage-for-age scale rates tend to identify minimum and maximum payments, partly because the breakdown of the progressive scale might mean loss in incentive value and partly because higher payments might give rise to friction and jealousies among members of the same age group.

In a number of countries the wage-for-age scale is calculated according to an annually increasing percentage of minimum adult rates in such a way that increases in adult rates are nearly always reflected in juvenile rates. Sometimes the calculation is determined by the basic minimum for adult workers and sometimes by the minimum adult rates applicable in the particular employment category. This type of wage scale is prevalent in Australia.

In view, however, of the wide gap frequently found between the basic wage minima set for men and for women, the percentages in the wage-for-age scale for girls are sometimes set higher than those for boys ; while in a few, rather untypical cases, the differential between boys' and girls' wages is made even more marked by allowing girls a lower percentage of women's rates. Examples of these two principles are found in state awards in New South Wales (Australia).[1]

Percentage differentials may also be calculated according to a diminishing scale of deductions from basic adult rates. The percentages to be deducted at various ages in a selected number of industries in Belgium may be seen in table III.

In France an annual minimum wage of 276,000 francs has been laid down for adults irrespective of the type of work. A deduction of 50 per cent. of this wage is made in the case of young workers between the ages of 14 and 15 years ; of 40 per cent. for those between the ages of 15 and 16 years ; of 30 per cent. for those between 16 and 17 years ; and of 20 per cent. for those between the ages of 17 and 18 years.

Contracts of apprenticeship, which offer systematic instruction in vocational techniques, are characterised by exceptionally low rates of wages. Provision is generally made, however, for progressive increases, on the premise that improved skills enable the apprentice to contribute more each year to the output of the undertaking. In Greece, for example, apprentices are entitled during the first six months of their apprenticeship to not less than 15 per cent. of the wage payable to a journeyman in the same trade.[2] Thereafter the amount is increased every six months by a percentage that depends on the duration of apprenticeship.

In some forms of apprenticeship, remuneration is determined by age as well as the years of apprenticeship completed.

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[1] In the state award relating to margarine makers and an industrial agreement between the Printing Employees' Union of Australia (New South Wales branch) and Hygienic Containers Pty Ltd ; see *New South Wales Industrial Gazette*, July and Aug. 1954.

[2] Decree respecting training of apprentices, dated 3 June 1952 ; see *I.L.O. Legislative Series*, 1952 (Gr. 3).

TABLE III. BOYS' WAGES IN BELGIUM—PERCENTAGES TO BE DEDUCTED FROM THE ADULT RATE

Industry	Age						
	14	15	16	17	18	19	20
Shoes [1]	65	60	50	40	30	20	10
Leather and pelts [2]	60	55	50	40	30	20	10
Chemicals [2]	60	60	50	40	30	20	10
Metal trades and non-ferrous metals [2]	50	50	50	40	30	20	10
Machine building [2]	50	50	50	40	30	20	10
Food processing and distribution [2]	50	50	50	40	30	20	10
Mines (surface) [3]	50	45	40	30	20	10	5
Mines (underground) [3]	50	40	35	30	20	10	5
Mirrors [2]	—	—	50	40	30	20	10
Gas and electricity [2]	—	—	50	40	30	20	10

[1] Based on adult rates in the employment category in which the young worker is employed.
[2] Based on the minimum wage of a skilled adult worker.
[3] Based on the minimum wage of an unskilled adult worker.

Apart from the formal apprenticeship system there is an increasing trend today to create a special category of workers—not necessarily restricted to young workers—called learners, who receive lower wages on the grounds that they are novices in a new trade and therefore stand in need of instruction during a period of limited efficiency. The period of induction extends sometimes over a few months, sometimes up to three years. Frequently the rates established for juvenile learners are below those of adult learners.

The Effect of Special Allowances and Supplementary Payments

In many industries today it is common to supplement wages by special allowances designed to meet rises in the cost of living. In some cases such allowances take the form of a flat rate payable to all employees irrespective of their wage classification. Thus, the General Motors type of agreement sets out a scale of cost-of-living index rises and notes the addition, in cents per hour, to the basic wage agreed upon in respect of each increase. On the other hand the practice has been adopted in some countries of establishing different rates of allowance for two or more broad wage classifications. For example, a recent award in India provides for a dearness allowance of 22 rupees a month for those earning a salary of up to 25 rupees a month or a daily wage under 15 annas 6 pies; and of 23 rupees a month for those earning a salary of over 25 rupees a month or a daily wage above 15 annas 6 pies but less than 3 rupees.[1] It is evident that in such cases there is no possibility of establishing a differential in the distribution of allowances except in the rare cases in which the sex or the age of the worker operates as a factor. On the other hand, in countries where cost-of-living adjustments are calculated as a percentage of the actual wage it may be that, unless a specific minimum allowance is agreed on, little appreciable adjustment in fact takes place in the lowest wage grades. In such instances, differ-

[1] Award No. I.C. 3-51-52 of 2 Dec. 1953, Mysore Paper Mills Ltd., Bhadravati (*Indian Labour Gazette*, Mar. 1954).

entials already existing in young workers' wages are made even more acute than before.

On the other hand, attempts have been made to bridge the gap between adult and juvenile rates by the allocation of special bonuses, allowances or fringe benefits for young workers.

In the Netherlands the wage-for-age scales described above may be augmented by a special merit bonus based on 12.5 per cent. of the average wage. In Newfoundland provision has recently been made for the allocation of weekly " living allowances " to apprentices throughout their period of training.[1] These allowances are as follows : $6 for those living at home ; $12 for those away from home ; $15.90 for those who are heads of families and who live at home ; and $21 for heads of families living away from home. In the United Kingdom a firm of optical and precision engineers has recently introduced a scheme whereby carefully selected apprentices, who will be expected to take the national higher certificate or a university degree after termination of their training, are entitled to receive, in addition to wages, special apprentices' allowances, which increase annually during the period of training ; for example, a boy 16 years of age earning £2 12s. 3½d. a week should expect to receive £8 6s. 10d. at the age of 21.[2]

In Belgium both employer and apprentice enjoy certain benefits from the Government in respect of the contract of apprenticeship. The former is exempted from payment of social security contributions and provincial and communal taxes. He also receives an annual allowance of 600 francs. The apprentice is entitled to a government grant of 160 francs and, according to whether his training is of one, two or three years' duration, to a special grant of 750, 900 or 1,050 francs upon the termination of his apprenticeship.[3]

Appreciable increases in apprentices' wages are sometimes made if on-the-job instruction is voluntarily supplemented by training courses outside the undertaking. This is true, for example, in the manufacture of leather goods, the shoe-making industry, machine-building, furniture-making, and the building trades in Belgium. In some cases training increments are payable on the basis of examination results. An industrial agreement concluded in October 1952 between Associated Newspapers Ltd. and the Printing Industry Employees' Union of Australia, New South Wales branch, provides that after the first year of apprenticeship every apprentice shall be entitled to attend a technical college for four hours a week over a period of three years.[4] Provided that such an apprentice can produce a certificate from the college showing satisfactory attention to the work of the school, no deduction may be made from his pay for the time of absence. School fees are in any case payable either by the undertaking or by the state government. On passing his first annual examination at a satisfactory standard, the apprentice is entitled to a wage increase of 5s. a week and, after the second and third annual examinations, increases of 7s. 6d. and 10s. respectively.

In Belgium an interesting innovation has been made by legislation providing for the special remuneration of young workers during annual leave. Not only is the period of leave longer than that offered to adults (double in the case of young workers between the age of 18 and 21,

[1] *Labour Gazette* (Ottawa), May 1955.
[2] *Personnel Management, Welfare and Industrial Equipment* (London), Jan. 1955.
[3] *La Voix des Jeunes* (Brussels), Feb. 1955.
[4] *New South Wales Industrial Gazette*, Oct. 1952.

and three times in the case of young workers under the age of 18 years), but the percentage of the annual wage payable as holiday remuneration is higher in the case of young workers : 8 per cent. for those under the age of 18, 6 per cent. between the ages of 18 and 21, and only 4 per cent. in the case of adult workers.

Another experiment is now being conducted in Belgium to meet the argument that young workers' wages should be based on short-term needs, since earnings in excess of actual needs are likely to lead to undesirable spending habits. The Unions Nationales des Fédérations de Mutualités Reconnues have set up a number of pre-marriage savings funds for boys and girls between the age of 14 and 27 years.[1] Membership over a period of three years before marriage carries with it a right to payment of 130 per cent. of actual savings ; membership between 12 and 24 months to between 115 per cent. and 120 per cent. of savings ; and of six to 12 months to between 105 and 110 per cent. of savings. If the worker does not marry before the age of 30, payments are made according to a special scale based on duration of membership.

Few tax concessions are made to young workers. In Japan, where the minimum taxable income is 70,000 yen per annum, plus deductions for social insurance and life insurance premiums and for dependants, student workers earning less than 150,000 yen are exempt from income tax. In France, where the minimum taxable income is 220,000 francs per annum, tax demands are made on the head of the family, the young workers' wage being deemed to supplement that of the chief breadwinner.

It should be noted that in many countries the minimum taxable income is at a level higher than the earning capacity of most young workers. In India and Pakistan, for example, few young workers earn as much as the minimum taxable income (4,200 and 3,600 rupees a year respectively). On the other hand, while wage rates have shown sharp increases in response to higher prices, the taxable minimum has not always shown a corresponding rise, so that the lower wage grades are gradually becoming subject to income tax. It is not unusual, for example, for young workers in the United Kingdom to earn £250 in a year, and any annual income of £155 or over is subject in that country to income tax. In the United States the minimum taxable income is $600 per annum, a figure easily exceeded by even the part-time earnings of young persons.[2] In some cases young workers are at a disadvantage from the point of view of tax liability. In Czechoslovakia all persons with not more than one dependant are subject to an increase of 60 per cent. in their tax liabilities or, if such persons are under the age of 25 years, to an increase of 40 per cent. in the amount of their tax contributions.

Recent Trends

Attempts to redefine the wage-earning status of the young worker may be said, broadly speaking, to have three different objectives : to narrow the differential gap where this seems so disproportionately wide as to give rise to injustice among a large group of the labour force ; to bring the remuneration of apprentices into line with con-

[1] Walter Leën : *Sécurité sociale et logement populaire* (Brussels, Editions Erasme, S.A.).

[2] It should be noted, however, that even though the earnings of young persons in excess of $600 a year are subject to income tax they themselves may be claimed as dependants if they are under the age of 19 and are attending school or college.

temporary wage practice ; and to ensure that, where the young worker is allotted tasks performed also by adults and he shows no difference of output, there should be the opportunity to earn equal rates of pay.

An example of the attempt to narrow unduly wide differential gaps is to be found in Japan, where the Council of National and Local Government Workers' Unions has been recently concerned to obtain a minimum wage of 8,000 yen monthly for employees under the age of 18. Official statistics show that the number of young workers earning wages approximating to this income is extremely low.

As regards apprentices' wages there is increasing awareness that in most cases they are disproportionately small, particularly in view of the fact that modern industrial and agricultural techniques nearly always call for a period of initial instruction for all workers, whether under organised systems of apprenticeship or special arrangements for learners, or on an informal basis.

As early as 1936, when the World Youth Congress was convened in Geneva under the auspices of the International Federation of League of Nations Societies, a recommendation was made calling for the regulation of apprenticeship by means of an international statute that would provide for progressive increases in wages and the recognition of equal pay for equal work. In 1939 the 25th Session of the International Labour Conference adopted an Apprenticeship Recommendation, which provided for the definition in every contract of apprenticeship of the relevant terms of remuneration as well as the period of total training.

In 1945 the Conference adopted a resolution concerning the protection of children and young workers, which stated that special efforts should be made to secure " the payment to apprentices of fair and reasonable compensation for productive labour performed as part of training and the inclusion in apprenticeship contracts of provisions regarding the methods of determining the remuneration and the scale of increase of remuneration during the apprenticeship ".

More recently, there has been in some countries marked pressure to eliminate the differential for apprenticeship. In the United States, the A. F. of L. and many of its affiliates have urged the Labor Department to abolish the sub-minimum rates permitted under the Wage-Hour Act for learners, apprentices and messengers.[1] The report of the A. F. of L. claims that—

> during the year ending 30 June 1952 the number of applications filed by the employers for permission to pay learners sub-minimum wages has been reduced by about half. It is thus clear that the overwhelming majority of employers do pay at least the statutory minimum wage of 75 cents an hour.

The report claims that most employers would eventually be willing to pay standard rates.

In Poland an Ordinance of 1952 provides that—

> during vocational training young persons shall receive remuneration for the number of hours worked, at the rates prescribed for workers graded in the lowest wage category in the wage table in force in the undertaking. After completing vocational training they shall be paid according to the ordinary rules applying to workers in the category in which the young person is graded at the end of the vocational training period.

The demand for equal pay for work of equal value has been expressed in many forms in recent years. The war years contributed

[1] *Labour Relations Reporter*, Vol. 30, No. 41, 22 Sep. 1952.

appreciably to the practical realisation of the principle of equal pay. In Canada, for example, the National War Labour Board issued in July 1942 a declaration of policy which included as its principal requirement that " basic wage rates, whether a range of rates or a single rate, are to be paid with respect to an occupational classification—not with respect to particular employees in a classification ", so that differentials based on sex and age were automatically excluded.

The Labour Code of Costa Rica of 1943 stated in unequivocal terms that wages may not be lower than the prescribed minimum and that no distinction is to be made on the grounds of age, sex or nationality. Similar provision was subsequently made in 1950 in Nicaragua and in 1951 in the Dominican Republic and Guatemala.

In 1945 a commission on the cotton spinning industry in the United Kingdom made special recommendations concerning the remuneration of young workers. While advocating the system of wage-for-age scales, the report of the Commission stated that—

> the scales would constitute minimum or fall-back wages. A further qualification is that where juveniles covered by such scales undertake work usually done by adults they should normally be paid the adult wage appropriate to the job.

The resolution of the International Labour Conference in 1945 mentioned above, concerning the protection of children and young workers, also contains reference to the principle of equal pay :

> Provisions with reference to wages paid to young workers should have the objective of assuring that they are paid wages commensurate with the work performed, observing wherever possible the principle of equal pay for comparable jobs.... Where the wage rates for young workers not employed under apprenticeship are customarily fixed separately from those of adults ... the rates should be fixed in the light of educational requirements, experience, job content and the average output of young workers, with provision for successive increases in minimum wage rates commensurate with the average time needed to gain proficiency, and without prejudice to the principle of equal pay for equal work ; where remuneration is based on output, special safeguards against overstrain should be introduced.

Three years later the Second Session of the Textiles Committee of the I.L.O. adopted a resolution which proposed that measures should be taken for " applying a wage-for-age scale for juveniles on condition that it is not contrary to the principle of equal pay for work of equal value ".

More recently important innovations have been introduced in the law and practice of many countries. In Belgium collective agreements regulating the mirror industry and the manufacture of gloves provide that wage-for-age scales shall not be applicable where young workers perform work equivalent to that of adult workers. Similar provisions exist for the calcium mining industry in Charleroi, Namur and Liège. In some branches of the cement industry provision has been made that young workers paid according to results and those on piece-work should be on the same wage basis as adults.

In France an Act of February 1950 requires that every collective agreement shall contain provision regarding " the modes of applying the principle of equal pay for equal work in the case of women and young persons ". The extension of this principle to the regional level may be seen in the terms of a collective agreement concluded in 1954 in respect

of the metallurgical industry in the Paris region, which provides that in all cases in which young workers under the age of 18 years are on piece-work or are paid by results and carry out, in a general way and under equal conditions of work, duties usually entrusted to adults, they shall be paid according to the rates established for the remuneration of adult employees.

In Hungary the Labour Code adopted in 1951 provides that—

> equal work shall confer a right to equal wages. In determining wages no distinction shall be made between men and women or between young persons and adults.

In India, too, there is some slight evidence of a trend towards the initiation of equal pay. A Notification of December 1954, for example, issued under the Minimum Wages Act of 1948, provides that in the state of Bombay, whenever adolescents are medically certified to perform work carried out by adults in road construction and in building operations they shall be entitled to the wages fixed for adults.

Recommendations made by the United States Department of Labor for recruitment on day-haul programmes of seasonal work provide that—

> young workers should be paid the same rate as adults for comparable work. If children are employed as a source of cheap labour, thus undermining the wage for adults, this will discredit the programme.

A final example of the trend towards equal pay may be quoted in relation to the special problem of piece-work. The Congrès Syndical des Jeunes, convened by the Belgian Branch of the Young Christian Workers, adopted a number of resolutions this year, including the following :

> The Congress requires that labour standards be established, that work be organised, and that wages for piece-work be calculated in such a manner that young workers may be able to earn a reasonable wage, without overstrain, in accordance with the principle of equal pay for equal work.

Many of the examples of the trend towards the raising of the young worker's wage-earning status will for some time remain expressions of intention rather than a description of practical achievement ; but it appears that a movement has been initiated that is gaining momentum. For this reason, and also because of the increase in the volume of juvenile labour expected in many regions of the world within the next few years, it is important that statistics be systematically collated of the wages paid to young workers in various forms of occupational activity, and that the entire question of equitable remuneration be carefully reviewed.

An Actuarial Analysis of the Pension Schemes in the Federal Republic of Germany and the Land Berlin

Under the provisions of the German Federal Social Insurance Code [1] *and the Pension Insurance Act for Salaried Employees* [2], *the Federal Minister of Labour is required to draw up every four years actuarial balance sheets analysing the financial position of the pension schemes for manual workers and salaried employees. The first post-war balance sheets concerning these schemes as in force in the Federal Republic of Germany and the Land Berlin were recently published* [3] *in a report of the Federal Minister of Labour.*[4] *A summary of the report is given below.*

The actuarial analysis of the two German pensions schemes is the first published since 1933.[5] Actuarial balance sheets drawn up immediately before the war and (in respect of the British Zone of Germany) in 1948 were not published.

The present analysis is based on the legislation in force on 1 July 1954. An Act of 23 November 1954 concerning the revalorisation of pensions and the increase of contribution rates from 10 to 11 per cent. of wages or salaries has not been taken into account.

The actuarial calculations are made on the hypothesis that the level of wages, the level of employment and rate of unemployment and the other factors that influence the income from contributions and the expenditure on pensions (e.g. the rate of incapacity for work as a result of sickness or employment injury) and also the natality and mortality rates of the population (as established in 1953) will remain unchanged. A rate of interest equal to 3.5 per cent. is taken into account. No other assumption has been made concerning economic, social or demographic development.

The actuarial analysis included (1) an estimate of the future annual results of the operation of the schemes (receipts, expenditure and accumulation of reserves) ; and (2) the drawing up of actuarial balance sheets on the basis of such estimates. All details of the calculations

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[1] Section 1391, as amended by the order of 17 May 1934 and the Act of 23 Dec. 1936; see *I.L.O. Legislative Series*, 1934 (Ger. 9) and 1936 (Ger. 2 *(c)*).

[2] Section 172, as amended by the order of 17 May 1934 (ibid.).

[3] *Bundesarbeitsblatt*, 1955, No. 6, 2 Mar., annex.

[4] A similar report by the Government Actuary on the working of the British National Insurance Act was recently published. See " An Actuarial Analysis of the British National Insurance Act ", in *International Labour Review*, Vol. LXXI, No. 3, Mar. 1955.

[5] The pre-war actuarial investigations on the German pension schemes are summarised in I.L.O. : *Actuarial Technique and Financial Organisation of Social Insurance*, by Lucien FÉRAUD, Studies and Reports, Series M, No. 17 (Geneva, 1940), pp. 271-441.

made for the purpose of such actuarial analyses are given in an annex to the report.

As a starting point the 1953 figures for receipts and expenditure were taken, and also the figure for reserves accumulated at the end of that year.

A study of the future development of the average amounts of pensions to be paid gave the results shown in table I.

TABLE I. AVERAGE AMOUNT OF PENSIONS PER MONTH

(In DM)

Pension	June 1953		Estimated for 2038 [1]	
	Manual workers' scheme	Salaried employees' scheme	Manual workers' scheme	Salaried employees' scheme
Invalidity and old-age :				
Men	90.80	130.60	203.80	190.90
Women	62.90	99.70	100.90	122.90
Widow's	49.20	62.80	96.50	88.60
Orphan's	31.80	37.70	60.20	55.30

[1] In the year 2038 the average amount of the pensions will have reached a stable maximum.

For the estimates of the future development of the expenditure on pensions, the assumption was made that the average amount of the pensions will rise equally from year to year between 1953 and 2038.

Other essential factors for estimating the future receipts and expenditure of the schemes are the presumable increase in the number of insured persons on the one hand, and in the number of pensioners on the other. For this purpose a study was made of the presumable development of the total population, so far as the number of men and women and the distribution in quinquennial age groups is concerned. This study was based on the 1950 census and the mortality tables drawn up in the light of the experience of the period 1949-51. The results of this study were used to estimate the number of insured persons and beneficiaries to be expected in the future. The total number of insured persons, and consequently also the amount of receipts from contributions paid, will remain rather stable in the future. The number of pensioners, however, will presumably develop as shown in table II.

TABLE II. ESTIMATED NUMBER OF PENSIONERS

(Thousands)

Year	Manual workers' scheme				Salaried employees' scheme			
	Invalidity and old-age pensioners		Widows	Orphans	Invalidity and old-age pensioners		Widows	Orphans
	Men	Women			Men	Women		
1953 [1] . .	1,308	1,000	987	1,003	407	182	430	256
1958 . . .	1,358	1,109	1,107	553	469	209	458	148
1963 . . .	1,443	1,216	1,233	237	530	231	492	73
1968 . . .	1,581	1,305	1,369	235	605	251	524	72
1973 . . .	1,678	1,358	1,501	235	652	260	556	72
1978 . . .	1,681	1,361	1,570	234	659	259	581	72
1983 . . .	1,574	1,331	1,568	226	611	254	595	70

[1] Actual figures.

TABLE III. ESTIMATED FUTURE RECEIPTS, EXPENDITURE AND RESERVES OF THE PENSIONS SCHEME FOR MANUAL WORKERS

(Million DM)

Item	1953 [1]	1958	1963	1968	1973	1978	1983	1988	1993	1998
Receipts :										
Contributions of insured persons and employers	3,272.2	3,434.7	3,398.5	3,408.7	3,384.8	3,401.5	3,436.2	3,443.9	3,421.9	3,382.5
State subsidies and reimbursements	1,429.4	1,811.3	1,772.1	1,915.6	2,041.8	2,090.6	2,044.5	2,041.6	2,062.0	2,132.9
Interest	78.8	278.6	442.5	549.6	588.0	565.2	510.4	430.6	303.1	99.5
Other receipts	16.8	6.5	6.5	6.5	6.4	6.5	6.5	6.5	6.5	6.4
Total . . .	4,797.2	5,531.1	5,619.6	5,880.4	6,021.0	6,063.8	5,997.6	5,922.3	5,793.5	5,621.3
Expenditure :										
Pensions	3,557.8	3,773.4	4,150.9	4,760.0	5,307.1	5,624.5	5,653.1	5,794.1	6,013.5	6,392.7
Other benefits	572.6	557.6	553.6	579.8	597.9	604.2	595.7	590.4	584.7	584.9
Other expenditure . . .	103.9	108.9	108.5	110.4	111.7	112.1	111.6	111.2	110.8	110.7
Total . . .	4,234.3	4,439.9	4,813.0	5,450.2	6,016.7	6,340.8	6,360.4	6,495.7	6,709.0	7,083.3
Surplus	562.9	1,091.2	806.6	430.2	4.3	—	—	—	—	—
or deficit	—	—	—	—	—	227.0	362.8	573.4	915.5	1,467.0
Reserves at end of year	2,577.1	7,555.0	12,459.2	15,763.3	17,091.5	16,569.3	15,018.4	12,796.6	9,269.0	3,626.6

[1] Actual figures.

TABLE IV. ESTIMATED FUTURE RECEIPTS, EXPENDITURE AND RESERVES OF THE PENSIONS SCHEME FOR SALARIED EMPLOYEES

(Million DM)

Item	1953 [1]	1958	1963	1968	1973	1978	1983	1988	1993	1998
Receipts :										
Contributions of insured persons and employers	1,603.2	1,671.1	1,701.6	1,707.3	1,694.2	1,699.7	1,711.4	1,723.7	1,723.4	1,704.0
State subsidies and reimbursements	408.3	664.0	625.9	632.9	629.4	619.4	585.5	567.7	555.2	560.8
Interest	39.4	153.8	254.1	333.8	387.0	422.4	458.1	501.1	545.6	582.2
Other receipts	1.7	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total . . .	2,052.6	2,490.0	2,582.7	2,675.1	2,711.7	2,742.6	2,756.1	2,793.6	2,825.3	2,848.1
Expenditure :										
Pensions	1,495.6	1,636.9	1,810.3	2,051.1	2,230.5	2,314.2	2,268.8	2,286.1	2,321.9	2,437.6
Other benefits	186.2	186.1	190.0	199.1	204.6	207.0	204.1	203.9	202.1	202.8
Other expenditure . . .	39.6	42.1	42.5	43.1	43.4	43.5	43.5	43.3	43.3	43.2
Total . . .	1,721.4	1,865.1	2,042.8	2,293.3	2,478.5	2,564.7	2,516.4	2,533.3	2,567.3	2,683.6
Surplus	331.2	624.9	539.9	381.8	233.2	177.9	239.7	260.3	258.0	164.5
or deficit	—	—	—	—	—	—	—	—	—	—
Reserves at end of year	1,260.3	4,158.0	7,118.8	9,512.2	11,134.0	12,190.9	13,199.4	14,436.5	15,733.6	16,843.2

[1] Actual figures.

On the basis of such studies the report estimates that the future receipts, expenditures and reserves of the two pensions schemes will be as shown in table III.

It follows from tables III and IV that in both schemes the contributions to be paid by the insured persons and employers are and will remain the main financial source. The receipts from such contributions are estimated on the basis of a contribution rate equal to 10 per cent. of wages or salaries ; in respect of compulsorily insured persons 5 per cent. is borne by the employers ; voluntarily insured persons have to pay the full contribution. As mentioned above, the increase of the rates from 10 to 11 per cent., as fixed by the Act of 23 November 1954, is not taken into account.

The state subsidies and reimbursements are relatively important for financing the two schemes, especially in respect of the manual workers' scheme. The State is legally obliged to cover—

(1) the basic pension rates in the manual workers' scheme ;

(2) certain increases in the pensions as fixed by law in 1951 and 1953 ;

(3) benefits to war victims ;

(4) pensions to persons who before 1945 were insured under German legislation outside the Federal Republic of Germany or were insured under foreign legislation and are residing in the Federal Republic (especially refugees) ;

(5) pensions payable to victims of nazism and to certain ex-prisoners of war ;

(6) subsidies for cures in cases of tuberculosis.

It is interesting to note that the proportion of income furnished by the interest-bearing reserves is relatively small. It covered in the manual workers' scheme 1.9 per cent. of total expenditure in 1953 ; when it has reached the maximum in 1973 it will cover 9.8 per cent., and in 1998 only 1.4 per cent. In the salaried employees' scheme such income covered 2.3 per cent. of total expenditure in 1953 and will cover 15.6 per cent. in 1973 and 21.7 per cent. in 1998.

It follows from the figures in tables III and IV that expenditure, especially on pensions, has a rising tendency. The indices of total expenditure in 1998 (1953=100) will be 167 for the manual workers' scheme and 156 for the salaried employees' scheme.

In the manual workers' scheme total receipts will exceed total expenditure from 1953 to 1973 ; after that year deficits must be expected, which will rise from year to year. In the salaried employees' scheme no deficit will occur before 1998, but the surplus will be smaller each year after 1958. The report states that under this scheme a deficit is to be expected only after 50 years. If the accumulated reserves can be used to cover the expected deficits, the manual workers' scheme will remain solvent for a further 25 years and the salaried employees' scheme for a further 50 years. However, the deficit in the first scheme will by that time be 3,200 million DM and in the second scheme 800 million DM per year.

In order to determine the average and stable premium by which the future expenditure of the schemes could be covered on the basis of an accumulation system, taking into account state subsidies and reimbursements and other receipts, actuarial balance sheets have been drawn up (table V). The figures reflect the actuarial value of future receipts and expenditure calculated for 1 July 1954 as well as the reserves

accumulated at that date. In both schemes an actuarial deficit was observed. The report points out that these deficits might be covered either by an increase in contribution rates from 10 per cent. to 11.57 per cent. of wages in the manual workers' scheme and from 10 per cent. to 10.13 per cent. of salaries in the salaried employees' scheme, or by an increase in the state subsidies of 540 million DM per year in the former scheme and 22.7 million DM in the latter.

TABLE V. ACTUARIAL BALANCE SHEET AS AT 1 JULY 1954 [1]

(Million DM)

Item	Assets		Item	Liabilities	
	Manual workers' scheme	Salaried employees' scheme		Manual workers' scheme	Salaried employees' scheme
Contributions of insured persons and employers	98,558.4	49,128.1	Pensions . .	156,860.7	62,748.0
State subsidies and reimbursements	59,535.5	18,343.9	Other benefits	16,859.8	5,768.2
Other receipts	189.9	32.2	Other expenditure	3,240.5	1,254.9
Reserves	3,235.5	1,625.7			
Actuarial deficit	15,441.7	647.2			
Total . . .	176,961.0	69,777.1	Total . . .	176,961.0	69,771.1

[1] Interest at 3.5 per cent.

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Problems and Prospects of the Cotton Textile Industry

The invention of mechanical spinning heralded the Industrial Revolution in England early in the eighteenth century. While the period that has elapsed since then has seen the growth of cotton textile factories in other countries—often with the direct help of English pioneers, as in India and the United States—it is but proper that a congress to take stock of the prospects and problems of the industry should have met in England, at Buxton, near Manchester, the mother of the cotton industry throughout the world.

The report of this Jubilee International Cotton Congress, held under the auspices of the International Federation of Master Cotton Spinners' and Manufacturers' Associations to celebrate the fiftieth anniversary of its foundation, deals with the various aspects of the development and future of the industry, mainly from a European angle.[1] Meanwhile the Indian cotton industry has been celebrating its centenary, and a handsome souvenir volume issued by a well-known textile journal in India makes a similar review from a primarily Indian point of view against a background of world developments.[2]

Together, these two publications give a panoramic picture of the industry and its problems as they have developed in different circumstances; they deal with a wide variety of subjects, ranging from the availability of raw cotton, the use of man-made fibres in the cotton industry, and technical improvements in spinning, weaving and finishing, to the possibilities of an increase in the consumption of cotton goods.

It is well known that the last 50 years have seen remarkable changes in the distribution of the productive capacity of the industry. At the International Cotton Congress Dr. Kroese, in a review of the changes since the tensions in the first years of the twentieth century caused by the disparity between agrarian and industrial production and the consequent shortage of raw cotton, emphasises the shift of the industry to cotton growing areas as one facet of the industrialisation of agrarian territories. India in this respect is not the only example. Mills in Argentina, Brazil, Egypt, Greece, Mexico, Peru and Turkey have increased their number of looms by upwards of 50 per cent. in the last 25 years. In the United States, while there has been a reduction

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[1] International Federation of Cotton and Allied Textile Industries: *The Cotton Industry—Today and Tomorrow.* Official Report on the Jubilee International Cotton Congress held at Buxton, England, 13-20 May 1954. Edited by Mario LUDWIG. Manchester, 1955. 288 pp.

[2] *Centenary of the Textile Industry of India, 1854-1954.* Souvenir number of *The Indian Textile Journal.* Bombay, 1954. 695 pp. 15 rupees; £1 3s.; $3.20.

in the number of spindles and looms, the actual production of cotton goods has increased owing to the modernisation of machinery and the increased use of automatic looms.

These changes are reflected in the world trade in cotton goods. Before the Second World War the export market was practically controlled by a strong though recent arrival, Japan, by England (ousted from first place by Japan) and by Western Europe, whose exports had remained relatively constant. During the last five or six years, however, India and the United States have become formidable competitors in the world market. Statistics of trade also show the overruling influence exerted by Asian and African buyers and the effect of the emergence of rayon and other man-made fibres in reducing the volume of trade in cotton goods.

From the European point of view there are three problems facing the industry: supplies of raw materials, the organisation of a more intense and therefore more efficient production, and the enlargement of Europe's share in a shrinking world market for cotton piece goods.

While the lack of cotton cultivation in the textile processing centres, Japan, Great Britain and continental Western Europe, puts them at a disadvantage compared with India and the United States, a well organised system of supplies can, by giving a choice in the purchase of cotton, offset to a great extent this disadvantage. Mechanisation in cotton growing (another subject dealt with by the Cotton Congress) opens up possibilities of better cotton at lower cost, but West European manufacturers can exercise little or no influence on the decisions affecting cotton crops, although they are responsible for more than 25 per cent. of the total world cotton consumption. It is therefore primarily in the field of improving the production of cotton goods that the manufacturers in Europe can take effective action. The review of technical developments (which is a feature of both the publications) shows that generally speaking mills are not so advanced in Europe as in the United States, and even where, as in the case of automatic looms, individual mills have achieved similar performance, the greater part of the industry is still lagging behind.

In India the issue is indeed whether further mechanisation—and in particular the introduction of automatic looms—is desirable. While the leading mill owners who have contributed to the souvenir volume have expressed the view that for the production of superior cloths at lower cost a change over to automatic looms is essential, it is known that trade unions are sceptical of any substantial reduction in costs and are opposed to further mechanisation in a country where labour is abundant. In opting for the use of more labour and less capital, however, the trade unions seem to be running the risk of making a substantial rise in the wages of Indian textile workers difficult, since in an internationally traded commodity such as cotton goods a wide disparity in costs will be impossible to maintain. Figures quoted by the Indian mill owner, Mr. N. Wadia, show that as against 826 operatives required to work 72,768 spindles and 1,900 looms in South Carolina, 6,000 to 7,000 operatives are required in India. Because of this the cost of labour in producing a pound of cloth works out at 15.96 annas in an Indian mill as against 16.91 annas in an American mill, despite the enormous difference in wages (100 rupees against 1,200 rupees a month).

The importance of increasing productivity and therefore of reducing the cost of cotton goods is apparent not only in the context of inter-

national competition but also in considering the future of the industry. The problem facing the cotton industry in Europe is thought to be above all a problem of excess production. It is, of course, in fact also a problem of under-consumption. The average consumption of cotton per head in Western Europe is about 4 kg., compared with 11.7 for North America, 1.6 for Asia and 1.3 for Africa. This shows that a rise in the standard of living in Asia and Africa opens up possibilities of expanding markets for cotton goods apart from the possibilities of increasing consumption per head in Europe, and expanding intra-European trade. While it is true that such a rise and an improvement in the economic structure may lead to the development of the cotton industry in these areas, part of this benefit will no doubt accrue to the older processing countries.

Problems of adjustment—particularly of reabsorbing displaced textile workers in older areas where the textile industries are declining—also deserve attention. A recent study [1] of displaced cotton mill workers (and other textile workers) in the New England area in the United States throws considerable light on the problems to be encountered and emphasises the relative immobility of textile workers. Although there is some evidence that the younger textile workers in particular have found employment in the expanding industries (such as electrical machinery, clothing and leather), for the older textile worker the only opportunity is often another textile job. There is a possibility that too much emphasis on the long-term changes and on the aggregate increase in the level of employment in the area may divert attention from the problem of persistent unemployment among textile workers. This study concludes, on the basis of the analyses of the causes and extent of the immobility of textile workers and on the results of two recent experiments (in Connecticut and New York), that positive programmes are necessary to encourage the movement of displaced textile workers to other industries and occupations. Mobility might be increased for instance by definite programmes of tests for unused aptitudes, retraining and more vigorous placement efforts carried on in conjunction with local development activities.

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New Series, No. 42: *Unemployment Insurance Schemes.* Geneva, 1955. iv+254 pp. $1.50; 9s.

Social security programmes directed against the risk of unemployment have been functioning in some countries for many years. However, such programmes have developed more slowly than the programmes for protection against other risks (such as sickness, employment injury, old age, invalidity and death). Unemployment has usually tended, in fact, to be among the last of the important social hazards to be dealt with through social security.

Only about one-fourth of the countries of the world have so far adopted legislation providing unemployment benefits, and even in these the degree

[1] William H. MYERNYK and Nadine P. RODWIN: *Inter-Industry Labor Mobility. The Case of the Displaced Textile Worker.* Boston, Massachusetts, Northern University, Bureau of Business and Economic Research, 1955. vii +158 pp. $2.75.

of adequacy of the schemes established varies considerably. One of the chief purposes of this study, therefore, is to provide information to countries considering the possibility of introducing unemployment insurance for the first time or of improving their existing schemes.

The study first presents a historical survey of the development of unemployment insurance, starting with the early voluntary schemes, through the first compulsory unemployment insurance Act adopted by Great Britain in 1911, down to the present day, when a total of 22 countries have unemployment benefit schemes in operation, 15 of them based on compulsory insurance, three on voluntary insurance and four on unemployment allowances provided on other than an insurance basis. The study then proceeds to a detailed examination of the basic elements of an unemployment insurance scheme, including its scope, eligibility requirements, disqualifying provisions, benefit rates, duration of benefits and methods of financing. It discusses a number of the principles involved in respect of these different elements and summarises the practices followed under existing schemes. It concludes with a review of basic principles to be followed in the administration of unemployment insurance.

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When the Nobel Peace Prize was awarded to Léon Jouhaux, a number of his friends arranged a ceremony on 16 January 1952, which was attended by many leading figures in politics, society and the arts. The speeches made on this occasion and the principal messages received by Léon Jouhaux have now been published in this illustrated booklet.

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ΣΒΩΛΟΣ, Α. Ι., and *ΒΛΑΧΟΣ, Γ. Κ. Τὸ Σύνταγμα τῆς Ἑλλάδος.* Two vols. Athens, *Κ. Μ. Παπαδημητρόπουλος*, 1954 and 1955. 328 and 366 pp.

It has been said that constitutional law sets a pattern for the whole science, since the chapters into which it falls run through all the other branches of law and provide a comprehensive view of organised society. This study of the Constitution of Greece by Mr. A. I. Svolos and Mr. G. K. Vlachos offers a striking illustration of the fundamental, synthetic character of constitutional law. It begins with a general survey of public law in Greece, extending not only to its institutions but also to individual rights and the social questions that are being handled more and more by constitutional provisions in the present age. On these matters the authors do not stop at a mere description of the prevalent system but add an independent, authoritative commentary on Greek rule and practice. Indeed, on each question they range far beyond the legislation of their own country and give a survey of the provisions in force elsewhere—and at the international level. Readers of the *International Labour Review* will be particularly interested in the passages concerning individual rights and Declarations of Rights (special chapters deal with the instruments recently adopted by the international agencies), equality before the law, and particularly equal pay for men and women workers, the right to work and freedom of employment, and freedom of association, particularly freedom to form trade unions. On this latter question the authors consider that the relevant international labour Conventions, though not yet ratified by Greece, should determine the effective interpretation of Greek law. In general, the valuable documentation, the interesting doctrinal arguments and the authors' scientific and yet generous approach will make these two volumes—soon to be completed by two others—a body of comparative constitutional law the like of which it is difficult to find in other languages.

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In this booklet, one of a series of legal studies, the author, a district officer in Morocco, after giving a general historical review of the Indian problem in the United States, analyses the administrative organisation responsible for Indian affairs. He then describes the land tenure arrangements, legal organisation and social policy adopted by the United States Government in dealing with the Indians. While acknowledging the differences in political outlook, the author makes an attempt to compile a short table comparing certain features of the administrative organisation of Indian affairs and the administration of the French Protectorate of Morocco in relation to the Berber groups, particularly those of the Middle Atlas. In the fifth and last chapter he attempts to draw lessons from American experience. The text includes statistical tables showing the distribution of Indians by state, the sources of income of Indian families and the main diseases causing death in the Indian tribes as compared with the United States as a whole.

COMMISSIONER FOR SCHEDULED CASTES AND SCHEDULED TRIBES. *Report for the Year 1954 (Fourth Report)*. By L. M. SHRIKANT, Delhi, Manager of Publications, 1954. vi+457 pp.

The report made annually to the President of India by the Commissioner for Scheduled Castes and Scheduled Tribes provides an occasion for a comprehensive review of the social, educational and economic progress of the scheduled castes and tribes, which enjoy special protection under the Indian Constitution. The administrative steps taken by the central and state governments to assist the growth of these communities serve as the framework for the report.

The work of the Office of the Commissioner for Scheduled Castes and Scheduled Tribes and the corresponding administrative organisations in state governments is supplemented by the activities of a number of well organised private bodies. These official and private agencies work together for the implementation of policies and specific plans, towards which considerable financial allocations are made by the Government every year. The present report shows in detail both the achievements of the year under review and new problems that arise from day to day. Emphasis continues to be placed on the eradication of the superstition of untouchability, one of the chief obstacles to the integration of millions with the main community.

The 27 appendices of the report contain a wealth of data on such matters as the population of the protected communities, their representation in the legislatures and governments, jobs found for them by the employment exchanges and the educational opportunities made available to their members. Recommendations are made for future action, and the action taken on previous recommendations is reviewed. The presidential address delivered by the Commissioner before the " tribal welfare " section of the Indian Conference of Social Work, which is reproduced in full, is of great theoretical interest.

CONVEGNO DI STUDI DI ECONOMIA E POLITICA DEL LAVORO. *Il progresso economico e i suoi aspetti sociali ed istituzionali*. Atti del Primo Convegno di studi di economia e politica del lavoro, Roma. Rome, Confederazione Italiana Sindacati Lavoratori, 1954. 291 pp.

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FONS-PONT, José. *Exigences techniques fondamentales de la justice sociale.* Economie de la solidarité. Preface by Pierre VINOT. Paris, Nouvelles éditions latines, 1954. 182 pp.+tables.

FORD, Alan W. *The Anglo-Iranian Oil Dispute of 1951-52.* A Study of the Role of Law in the Relations of States. Berkeley and Los Angeles, University of California Press, 1954. xii+348 pp. $1.10.

In the words of the author, the purpose of this study is twofold : it attempts " to describe the progress of the Anglo-Iranian oil dispute through July, 1952, the date of the International Court of Justice's order dismissing, for lack of jurisdiction, the United Kingdom's application to submit the dispute to the Court for a judicial determination ", and it is also " a study of the role of law in the relations of states ". This raises the question how far it is possible to explain the Iranian oil crisis by shifting the emphasis from political, economic and social factors to judicial considerations which exerted much less influence. The complex story of the crisis could be understood better if more emphasis were given to the historical background of both Iran and the whole of the Middle East and to the consequences of the encounter between the civilisation of this area and that of the modern industrial West.

It is true that the author includes a brief sketch of the various political events that have taken place in Iran in the last 40 years or so. But a mere calendar of events, together with a few comments on the politics of Iran and the Great Powers, is not adequate to explain the trends that eventually led to the disruption of the industry on which the economy of the whole country depended.

The nationalisation of the oil industry was a product and expression of Iranian nationalism, " which is both anti-imperialistic and xenophobic ". The social consequence of this nationalism, which " became merged with the social struggle of the masses of poverty-ridden peasants in Iran " was that the oil industry, being the main industry in the country but of foreign origin, became the focus of social and political discontent. When appraising the role played by the industry, Mr. Ford observes : " This social discontent, which is so obvious throughout most of the Middle East, is the expression of the ' revolution ' now in progress. The real ' revolutionary ' force in the Middle East has not been Communism, or any other ideology, but the ' revolutionary ' oil industry. The introduction of Western culture and technology through the oil industry, and to a lesser extent through other commercial enterprises, has created a change in the traditional patterns of thinking, and, for Middle Easterners directly employed by the oil companies, a change in the patterns of behaviour. This change in the traditional habits of thought and action is the real revolution, and it has, in turn, created pressures for changes in the traditional social order." This and similar observations scattered throughout the book make it all the more regrettable that the author did not devote more of his study to the social and economic aspects of the problem.

In the part dealing with the role of law in the relations between States the author finds that " international society and its legal system are, therefore, faced with the choice of accepting a constantly growing anarchy that threatens their very existence, or of reformulating the international norm in such a manner that it will provide workable solutions to the international problems that are created by nationalisation ".

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INSTITUTO NACIONAL INDIGENISTA. *Qué es el I.N.I.*, Mexico, 1955. 96 pp.

An explanatory booklet issued by the Mexican National Indian Institute [1] to explain the origin, character and work of that body, which was set up under a decree of 10 November 1948.

The booklet also gives the text of the laws and regulations governing the foundation of the Institute, and an account of its fundamental purposes and duties. The appendix contains the text of the Conventions concluded by the Institute with the other government bodies most directly concerned with the problems of the country's Indian peoples ; it also reproduces the agreements setting up the Tzeltal-Tzotzil, Tarahumara, Papaloapan and Mixtec co-ordinating centres.

— *Bibliografía indigenista de México y Centroamérica (1850-1950).* By Manuel Germán PARRA, and Wigberto JIMÉNEZ MORENO, Memorias del Instituto Nacional Indigenista, Vol. IV. Mexico, 1954. ci+342 pp.

This bibliography of works dealing with the Indian peoples of Mexico and central America lists books and articles that appeared between 1850 and 1950. It is essential to any library specialising in Indian affairs. Presentation is by subject matter (ethnology, economics, linguistics, technology, etc.), and there are 31 chapters. There is also an article on general trends in present-day Mexican policy towards the Indians. The analytical index at the end of the book is divided into three parts : an index of the names of authors and institutions, an index of place names and an index of the names of Indian peoples and languages in Mexico and Central America.

— *El problema indígena Tarahumara.* By Francisco M. PLANCARTE, Memorias del Instituto Nacional Indigenista, Vol. V. Mexico, 1954. 110 pp.

This work deals exclusively with the Tarahumara Indians. The author describes the geophysical background, the population and the cultural and social characteristics of the region, various problems (economic, health and hygiene, education, etc.) and ends with an account of the various schemes that have been carried out by the Tarahumara co-ordinating centre. The appendices give details of the population censuses held in this region and the book also contains a map.

— *Métodos y resultados de la política indigenista en México.* By Alfonso CASO, Silvio ZAVALA, José MIRANDA and others. Memorias del Instituto Nacional Indigenista, Vol. VI. Mexico, 1954. 303 pp.

This book, which is written by leading experts, deals with the methods employed in the Mexican Government's Indian policy and the results obtained, and gives a useful general picture of the problems of the country's Indian population and the extent to which they have been integrated into the national community. The first part, by Professor Alfonso Caso, discusses the Indian institutions of the pre-Colombian period ; the second, by Mr. Silvio Zavala and Mr. José Miranda, studies the Indian institutions of the colonial period ; the third, by Mr. Moises González Navarro, deals with

[1] See the article by Mr. Alfonso CASO, Director of the Institute, in this issue of the *International Labour Review.*

the same institutions since Mexico became independent; and the fourth and last part, by Mr. Gonzalo Aguirre Beltrán and Mr. Ricardo Pozas, deals with Indian institutions in modern Mexico and the changes in the living conditions of the Indian peoples that are hoped for as a result of the co-ordinated policy now being pursued.

— *Los Mazatecos y el problema indígena de la cuenca del Papaloapan.* By Alfonso VILLA ROJAS. Memorias del Instituto Nacional Indigenista, Vol. VII. Mexico. 1955. 177 pp.

In this study of the Mazatec Indians and the problems of the indigenous peoples of the Papaloapan river basin, the author has sought particularly to bring out the importance of the cultural impact—on an indigenous population that was practically untouched by modern techniques—of the large-scale construction projects undertaken by the Mexican Government in the Papaloapan basin (building roads and an electricity plant, damming the river to prevent periodic flooding, resettlement of certain Indian communities, etc.). Secondly, he has sketched an over-all cultural picture of the Mazatec province with the aid of archaeology, ethnology and history.

The book falls into four sections. Part I, " Panorama of the Papaloapan Basin ", deals with the environment and the people and refers also to the social importance of the projects undertaken in the region. Part II, " Introduction to the Mazatec World ", gives a geographical picture and makes use of archaeological, historical and ethnographical data. Part III, " Life and Problems of the Mazatecs ", examines their social and political organisation, their beliefs and ritual practices, and enumerates the chief problems that now arise (land, health, nutrition, alcoholism, education and economic outlook). Part IV, " Transformation of the Mazatec World ", deals with the questions raised by the readjustment of the old village and life in the new. The book also contains geographical and geological maps, a comprehensive bibliography and an analytical index.

Like the preceding volumes in the same series, this is a very important contribution to the study and understanding of Indian problems in Mexico.

КАСИМОВСКИЙ, Е. Режим экономии—важнейший рычаг под'ёма народного хозяйства СССР. Moscow, Госполитиздат, 1954. 104 pp. 1 rouble.

The author, E. Kasimovski, deals with the technique of management in a socialist economy based on the conscious employment of the economic laws of socialism. He points out the need for economies in order to raise productivity, save labour, make better and longer use of plant, buildings and equipment, reduce consumption of raw materials, fuel, power, etc., and cut costs.

The purpose of these economies, according to the author, is to expand production, raise the workers' living standards and thereby hasten the movement of the Soviet people towards communism.

He states that there is still substantial scope for economies, particularly in human effort (through higher productivity), in the more economical and efficient use of raw materials, fuel, etc., in more efficient use of tools and equipment, and in the reduction of costs, and that the principal uses, in order of importance, to which these savings should be put are the raising of the workers' cultural and technical standards; the improvement of production techniques and technology; and the improvement of the organisation of production and labour. This can be achieved through the development of socialist emulation.

In support of his argument the author quotes a number of examples from the daily life of a socialist society.

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" Social and Economic Reorganisation in Czechoslovakia ", by A. A. Khachaturov.

KLUGMANN, Werner. *Die Hamburger Hafenarbeiter. Soziale Probleme beim Güterumschlag.* Hamburg, Schiffahrts-Verlag " Hansa " C. Schroedter und Co., 1954. 127 pp.

A detailed study of the working and living conditions of dockers in the port of Hamburg, with particular reference to such problems as remuneration, stabilisation of employment, housing conditions and labour-management relations. The author describes the efforts made to improve conditions in the past and makes suggestions for further improvements with a view to industrial peace and a lasting rise in the productivity of the dockers.

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LANGENFELT, Gösta. *The Historic Origin of the Eight-Hours Day.* Stockholm, Almqvist and Wiksell, 1954. 151 pp. 15 kronor.

A study of the origin (in England) and development of the tradition of devoting eight hours in each 24 to work. The author gives a colourful and erudite account of notions of time in early societies and of the social and philosophical background in England through the centuries in relation to the working hours of labourers and workmen. There are many quotations from literature and chronicles, which make attractive reading.

LEE, William Alexander. *Thirty Years in Coal, 1917-1947. A Review of the Coal Mining Industry under Private Enterprise.* London, Mining Association of Great Britain, 1954. 255 pp. 16s.

LEWIS, John Spedan. *Fairer Shares. A Possible Advance in Civilisation and Perhaps the Only Alternative to Communism.* London, Staples Press Limited, 1954. ix+244 pp. 8s. 6d.

The author of this book is the founder and chief executive of the John Lewis Partnership, which owns a large group of department stores in the United Kingdom. It presents the case for producer-co-operation as a method of sharing income more fairly, and takes the John Lewis Partnership as an illustration.

Parts I and II indicate the essentials of producer-co-operation and how it differs from ordinary private enterprise, consumer-co-operation and public enterprise. Producer-co-operation is defined as " profit-seeking enterprise upon the independent initiative of two or more persons without any exploitation of some by others, so that all of the workers, managers and managed alike, will be sharing fairly, that is to say as equally as is really possible, all of the advantages of ownership ". Parts III and IV give suggestions concerning management and managerial policy in these producer-co-operatives.

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ROLL, Eric. *A History of Economic Thought.* Revised and enlarged edition. London, Faber & Faber Ltd., 1954. 540 pp. 30s.

ROLPH, Earl R. *The Theory of Fiscal Economics.* Publications of the Bureau of Business and Economic Research, University of California. Berkeley and Los Angeles, University of California Press, 1954. xiv+310 pp. 34s.

SACHERL, Karl. *Berufsmensch und Privatmensch. Eine sozialpsychologische Untersuchung der typischen Grundmöglichkeiten ihres Verhältnisses.* Göttingen, Verlag für Psychologie, Dr. C. J. Hogrefe, 1954. 156 pp.

SAXENA, S. K. *Nationalisation and Industrial Conflict.* Example of British Coal-Mining. The Hague, Martinus Nijhoff, 1955. viii+185 pp. 10 florins.

SCHMASSMANN, Werner. *Die Zahlungsbilanzschwierigkeiten Westeuropas nach dem II. Weltkrieg insbesondere gegenüber den USA.* Eine Studie über die Problematik des Zahlungsbilanzausgleichs unter Berücksichtigung sowohl theoretischer als auch praktisch-politischer Aspekte. Inaugural-Dissertation zur Erlangung der Würde eines Doktors der Staatswissenschaften der Philosophisch-Historischen Fakultät der Universität Basel. Zürich, Polygraphischer Verlag A.G., 1954. 201 pp.

ШЕВЦОВ, И. Юность Болгарии. Moscow, " Молодая Гвардия ", 1954. 112 pp 1.65 roubles.

A study of the youth of Bulgaria, by I. Shevtsov.

THOMPSON, C. H. and WOODRUFF, H. W. *Economic Development in Rhodesia and Nyasaland.* London, Dennis Dobson Ltd., 1954. 205 pp. 21s.

TINBERGEN, J. *International Economic Integration.* Second, completely revised, edition. Amsterdam, Brussels, Elsevier, 1954. 191 pp.

TISSIER, Pierre ; HYMANS, Max ; MARIE, Jean, and others. *Les transports en France et dans le monde et le tourisme international.* Collection d'études économiques directed by Louis BAUDIN. Paris, Librairie générale de droit et de jurisprudence, 1954. 267 pp.

Contains a series of general articles, written by highly placed persons in various branches of transport, on rail, air, maritime and motor transport, inland waterways, and long-distance and tourist travel by land. Each includes a lively and well informed historical outline of developments since the nineteenth century and of problems affecting the future of the particular branch. The influence of economic and social factors, political events and technical developments are discussed, as well as the repercussions of the development of aviation and motor transport on older means of transport. The essential role of aviation in the organisation of transport in underdeveloped countries is emphasised.

URIBE C., Andrés. *Brown Gold. The Amazing Story of Coffee.* New York, Random House, 1954. xii+237 pp. $5.

WIENER, Norbert. *The Human Use of Human Beings.* Cybernetics and Society. London, Eyre and Spottiswoode, 1954. 199 pp. 18s.

WILGUS, A. Curtis (editor). *The Caribbean : Its Economy.* Gainesville, University of Florida Press, 1954. xix+286 pp.

Contains the papers contributed to the Fourth Annual Caribbean Conference of the University of Florida. Of special interest to labour are the papers by Mary M. Cannon on " Labour and Government in the Caribbean " and by Ernest Schwarz on " Some Observations on Labour Organisation in the Caribbean ".

Statistics.

INSTITUT NATIONAL DE LA STATISTIQUE ET DES ÉTUDES ÉCONOMIQUES. *Code des catégories socio-professionnelles.* 1re partie : *Principes — Code analytique ;* 2me partie : *Index alphabétique des catégories socio-professionnelles ;* 3me partie : *Statut (Code analytique et code alphabétique) ;* 4me partie : *Correspondance avec la nomenclature des métiers et des activités individuelles.* Paris, 1954. 164 pp.

ПЕТРОВ, А. И. Курс экономической статистики. Second edition. Moscow, Госстатиздат, 1954. 564 pp. 11.60 roubles.

The second edition of this basic textbook for higher schools of economics, prepared by a group of professors of the Moscow Economic Institute and edited by A. I. Petrov, has been revised in the light of reviews and criticism of the first edition.

The volume provides a broad description of Soviet statistics and methodology under eight headings. Part I treats of general bases of Soviet statistics, Part II the classification and grouping of data by region, branch of economic activity, degree of fulfilment of plan, etc., Part III statistics of population level, reproduction rate, migration, censuses of population, and regular periodic demographic series and Part IV statistics of national wealth, with special emphasis on statistics of capital equipment and statistics of tooling for industrial and energy production. Part V is devoted to statistics of social production and deals in turn with industrial production, agricultural production, production in other sectors, manpower resources, labour productivity, methods of wage payment, a critique of " bourgeois production and labour statistics," and statistics of the cost of production. Part VI discusses statistics of the supply of goods, turnover, and movement of goods, Part VII statistics of national income, finance, and consumption and Part VIII problems of making the balance sheet of the national economy.

The methodological emphasis is on the calculation of percentages, coefficients, and indices for purposes of analysis. Less attention is paid to frequency distributions and measures of dispersion, and none to scientific sampling. A principal drawback of the volume is the lack of an index.

ZIMMERMANN, Horst. *Bilanzierung der Geldeinnahmen und Ausgaben der Bevölkerung in der Deutschen Demokratischen Republik, ihren Bezirken und Kreisen.* Berlin, Verlag Die Wirtschaft, 1954. 214 pp.

Industrial Relations ; Employers' and Workers' Organisations.

ALLEN, V. L. *Power in Trade Unions. A Study of Their Organisation in Great Britain.* London, New York, Toronto, Longmans, Green & Co., 1954. xi+323 pp.

This study of trade union organisation in Great Britain is divided into two parts. The first discusses the application of the democratic principle to trade union organisation. The second analyses in some detail the delegation of power in trade unions, concentrating on how policy is made, the powers and functions of executive bodies and the role of national trade union leaders.

The author emphasises that over the first half of the present century trade unions in Great Britain have increased considerably in size, and their problems of organisation and administration have become increasingly complex and difficult. There has been evidence of conflict between the desire for self-determination by local branches and the need for efficient central administration to meet changing economic and industrial conditions. As the unions have grown larger and sought greater efficiency they have become more bureaucratic, and the balance of power has tended to shift from rank and file members to specialists. There may be net gain from the standpoint of results accomplished, but lay control tends to diminish, and new problems of union government arise. In a general way, there has been a notable tendency for power over union policy and affairs to become

increasingly concentrated in the hands of a relatively small number of individuals at the centre : these are the people with organisational control, responsible for the control of funds and the negotiation of agreements. At the present moment the problem of democracy versus efficiency is one of the hardest problems confronting the whole trade union movement.

Trade unions are, apart from the State and the churches, the largest single units of organisation in the United Kingdom in terms of size and diversity of membership. Their principal source of strength lies in their mass membership. Their size is the most important factor determining their relations with employers and with the State.

Some believers in industrial democracy have been perturbed by the growth of bureaucracy and functional specialisation in the unions and by the lessened concern with self-government and active membership participation. But trade unionists tend to judge the success of their unions on the basis of their ability to " deliver the goods ", primarily in the form of wage increases, and are not greatly concerned with exercises in industrial democracy. It is the voluntary nature of the unions that, in the author's view, constitutes the most important safeguard of the members' interests in present-day conditions. But since through the unions workers give up their right to act as free agents, what element of compulsion is there in trade union organisation ? What degree of discipline is consistent with the voluntary character of the unions ?

Where a trade union can positively penalise a member who rebels against union discipline, e.g. by forcing an employer to dismiss him from employment, the trade union is in effect a compulsory organisation. Economic pressure is in most cases as potent a directive as physical controls that might be imposed in totalitarian countries, and few workers who have been faced with such disciplinary measures would have any illusions as to their effects. In present practice the highest measure of trade union control over workers is inherent in the " union shop " and particularly the " closed shop " agreements negotiated with employers : the application of such agreements is of the utmost political importance and crucial to the examination of power in trade unions. Strikes related to trade union principles have changed their character. They are no longer for recognition or the right to organise but for 100 per cent. trade union membership.

Once trade unions become compulsory organisations rather than voluntary societies, the government is forced to take an active part in their internal organisation, in order both to subordinate trade union " legislation " on behalf of their members to the general laws of society and to ensure that trade union affairs are conducted democratically in accordance with the wishes of members. In such circumstances, the author states, the trade unions would lose their vitality and identity, and the one check on the authority of trade union leaders that operates automatically—voluntary membership figures, the " unfailing barometer of rank-and-file opinion "—would disappear. Thus, in his view, the trade unions must remain voluntary societies.

But the unions must also be efficient not only in terms of satisfying membership demands but also under conditions requiring some form of disciplinary rules voluntarily acceptable to their members. Control in the unions is shifting to a minority in the process of growth. How then is contact to be maintained with the rank and file ? Only, the author concludes, by active participation in union government. But what happens if the rank and file are not interested in self-government ?

The impression gained from casual observation of the trade union movement today is that " its house is not in order ". Trade unions are increasingly undemocratic. Few rank-and-file members are interested in union management ; these few, along with the officials, have disproportionate power and responsibility. There is no real contact between leaders and the rank and file, and the leaders are suffering from hardening of the arteries.

On the other hand, union membership is increasing and on the whole this suggests satisfaction with services received. Low attendance at branch meetings means nothing in itself, unless it can be taken as a token of member-

ship satisfaction. A very high degree of active rank-and-file participation in union management is not essential so long as the union is a voluntary society. But trade unions operating on a union or closed shop basis are in a different position. Since they are in effect compulsory organisations, it is important that there should be legally sanctioned provisions to ensure democratic rules and operations.

Inevitably, however, lay participation in union affairs is and will remain essential, primarily, in the author's view, in order to ensure effective communications, to exert restraint over officials, and to provide a breeding ground for union leadership growing up from the ranks. A detailed analysis of the written constitutions of 127 unions affiliated to the T.U.C., and representing over 98 per cent. of the affiliated membership, is made to show how the problem of union democracy is being tackled.

Particular emphasis is placed on the difficulties, in present conditions, of developing deliberation rather than mere consent in the policy-making bodies and of ensuring that rank-and-file opinions find their way into national policy decisions. So far as the trade union executives are concerned, most of them now are representative bodies based on either geographic or trade divisions or both. Their present-day tasks of supervision, co-ordination and control have been directly derived from the centralisation of trade union administration that became necessary with the growth of unions and the spread of national collective bargaining with central employers' organisations. Some of the unions are still not equipped to cope with the needs introduced by national bargaining, and there are relatively wide differences in the ability of the executives to exercise their functions. The important role of the general secretaries in modern trade union affairs is analysed in detail. The author points out that their powers are controlled by the constitutional provisions of the unions but that they obtain a power in union affairs far transcending their constitutional power by reason of the special knowledge they obtain from experience and the documentary materials and specialist services on which they can draw.

ALTIGOS, Jean. *Les relations industrielles.* Essai critique. Lausanne, Imprimeries Réunies, 1954. 96 pp.

BORKOWSKI, H. and KRAKOWSKI, L. *Komisje Rozjemcze.* Warsaw, Wydawnictwo Zwiazkowe CRZZ, 1954. 158 pp. 4 zlotys.

Contains texts relating to the joint arbitration boards responsible for the settlement of individual labour disputes in public undertakings in Poland, with commentary. The boards were established under a decree of 24 February 1954.

FRANKEL, S. J. and PRATT, R. C. *Municipal Labour Relations in Canada.* Montreal, Canadian Federation of Mayors and Municipalities and McGill University, 1954. v+87 pp.

INTERNATIONAL CHAMBER OF COMMERCE, COMMISSION ON ASIAN AND FAR-EASTERN AFFAIRS. *Proceedings of the Third Session held in Bombay (India) on December 17 and 18, 1954.* New Delhi, 1954. 77 pp.

МАТКОВСКИЙ, Н. Краткий очерк профсоюзного движения в Англии. MOSCOW, Профиздат, 1954. 140 pp. 2.70 roubles.

A "Brief Analysis of the British Trade Union Movement", by N. Matkovski, from the formation of the first unions until the present day. It includes a review of the principles and objectives of the movement before the Second World War and the policy of British trade union leaders in the post-war period.

PAGÈS, Jean. *Les relations humaines dans l'entreprise. La psychologie ouvrière. Les exigences sociales de notre temps. Le comportement du chef.* Grenoble, Union des ingénieurs Dauphiné-Savoie, 1954. 51 pp. 100 francs.

RICHARDSON, J. Henry. *An Introduction to the Study of Industrial Relations.* London, George Allen & Unwin Ltd., 1954. 442 pp. 30s.

This book gives a comprehensive survey of the field of industrial relations, with emphasis on the relations between the parties in industry, particularly with respect to working conditions. " The establishment and maintenance of satisfactory relations in industry is one of the main social and political tasks in a modern community .... Although this volume is concerned with human relations in industry, these are inseparable from working conditions. The two interact closely and conditions greatly affect the state of relations. Improved relations almost invariably lead to improved conditions, while improved conditions usually react favourably upon relations."

The proper purpose of the study and practice of industrial relations is, in the author's view, to secure the highest possible level of mutual understanding and goodwill between the several interests which take part in the processes of production, trade and transport. There has been an increasing recognition in recent years that progress depends not only on improved material conditions but also on the development of a friendly atmosphere and a spirit of working together for a common purpose, with an acceptance of the obligations implied for both parties.

The book is divided into five main parts : the first draws out the importance now attached to problems of industrial relations at the plant level. It covers personnel management, selection, training, time studies, methods of wage payment, job evaluation, merit-rating and non-wage incentives, profit sharing and co-partnership and joint consultation at the workplace. The chapter on joint consultation emphasises that the unobtrusive day-to-day relations at the workplace are the alpha and omega of the whole problem of industrial relations. The initiative for joint consultation lies with management, but the development of co-operative attitudes by all concerned is the secret of its success and far more important than methods or machinery. There has been considerable discussion of the powers of joint consultative bodies, but if the system is working smoothly it becomes irrelevant to try to define precisely the powers of such bodies and the limits of managerial authority : the main result is co-operation based on fair dealing, mutual respect and understanding.

The second part, on collective relations, covers freedom of association, the bases of trade unions, their legal position, political action by trade unions, employers' organisations and collective bargaining.

The part on wages and hours of work deals with wage bases and principles, relative wages, equal pay for equal work, family allowances and hours of work, emphasising these questions as central to the problems of industrial relations.

In the part on state intervention in industrial relations the problems and methods of such intervention in wage policy, and in the settlement of industrial disputes by conciliation and arbitration are reviewed, and the main aspects of social security are outlined. The possibilities of a national wage policy and some problems of industrial relations in nationalised industries are examined.

The section on the international aspects of industrial relations deals briefly with international federations of workers and employers and with the I.L.O., " the focus of industrial relations in the international field ".

The conclusions to the book re-emphasise that the fundamental purpose of industrial relations is to facilitate production by securing harmonious working associations between labour, management and capital. " The basic problems are not strikes and lockouts but the regulation of working conditions, and the promotion of better understanding between management and workpeople at the place of work." Technical efficiency is not enough ; good human relations are at least as important for success. Industry is a joint enterprise, and the distinction between the two " sides " has, in the writer's view, been much overstressed. Now, some of the more enlightened employers and trade union leaders recognise that the " two sides " attitude

has to be broken down and more attention given to matters of common interest to workers and management alike. This implies a willingness on the part of both parties to put duties and efficient service before rights. The basic elements for unity within industry are " honest work, thrift, and fair dealing between man and man ".

STUDENT LEAGUE FOR INDUSTRIAL DEMOCRACY. *Steward Training in C.I.O. Unions.* By Mildred BERSH. New York, 1954. 39 pp. 25 cents.

Labour Law.

LAMAS, Diego, and RUPRECHT, Alfredo J. *Repertorio general de gaceta del trabajo.* Jurisprudencia, Doctrina, Legislación, Bibliografía, 1945 a 1952. Vol. I, Parts I and II. Buenos Aires. Editorial Bibliográfica Argentina, 1954. Part I : 478 pp. ; Part II : 478 pp.

MAZZONI, Giuliano. *Il contratto di lavoro nel sistema del diritto italiano del lavoro.* Second edition. Florence, Istituto di Studi Sindacali e del Lavoro, 1954. xii+440 pp. 3,000 lire.

SAYMEN, Ferit H. *Türk iş hukuku.* Istanbul, Ismail Akgün Matbaasi, 1954. 648 pp.

Management.

BURSK, Edward C. (editor). *The Management Team.* Cambridge, Massachusetts, Harvard University Press, 1954. 221 pp. $4.

CONFEDERACIÓN GENERAL ECONÓMICA DE LA REPÚBLICA ARGENTINA. *Primer Congreso de organización y relaciones del trabajo.* Organizado por la Confederación General Económica con la colaboración del Instituto Argentino de Relaciones Industriales. Buenos Aires, 1954. 180 pp.

DRUCKER, Peter F. *The Practice of Management.* New York, Harper & Brothers, 1954. ix+404 pp. $5.

GERWIG, Ernst. *Organisation und Führung industrieller Unternehmungen.* Second, revised edition. Stuttgart, C. E. Poeschel Verlag, 1954. 314 pp.

INDUSTRIAL RELATIONS COUNSELORS. *Steadier Jobs. A Handbook for Management on Stabilizing Employment.* New York, 1954. 123 pp. $2.25.

MCCLOSKEY, Joseph F., and TREFETHEN, Florence N. (editors). *Operations Research for Management.* Introduction by Ellis A. JOHNSON. Baltimore, Johns Hopkins Press, 1954. xxiv+409 pp. $7.50.

Manpower.

CRONER, Fritz. *Die Angestellten in der modernen Gesellschaft.* Eine sozialhistorische und soziologische Studie. Frankfurt-am-Main, Vienna, Humboldt-Verlag, 1954. 265 pp. DM 9.50.

INDUSTRIAL WELFARE SOCIETY, Inc. *Part-Time Employment of Women.* A Review of Present-Day Schemes. London, 1955. 25 pp. 1s.

This booklet reviews present-day schemes for the part-time employment of women in Great Britain and discusses briefly the nature and organisation of such work in industry, the retail distributive trades, offices and the professions.

Experience in Britain does not suggest that part-time workers are less interested in their work or less reliable than full-time workers. It is often found that their output is at least as high as that of full-time workers and in some cases may be higher. Absenteeism and turnover have been no higher among part-time workers than among full-time workers.

There is every indication that women want part-time work, and it is in the national interest to provide them with such work. Indeed, the shrinking

of the population of working age may make it necessary to introduce part-time work much more generally. The booklet concludes with a query as to whether the time is not ripe for an inquiry into the possibility of adjusting conditions so as to make it possible for women to be employed on a part-time basis and for an inquiry into the economics of the different methods of regular part-time employment.

Appendices contain observations by employers, a table giving the total number of women employed part-time and full-time in different industries, and a check-list aimed at assisting managements to decide whether the employment of part-time women would help them to meet some of their recruiting problems.

JAFFE, A. J., and CARLETON, R. O. *Occupational Mobility in the United States, 1930-1960.* Preface by Seymour L. WOLFBEIN. New York, Columbia University, King's Crown Press, 1954. xiv+105 pp.+tables. $2.75.

LYTLE, Charles Walter. *Job Evaluation Methods.* Second edition. New York, Ronald Press Company, 1954. vii+507 pp. $7.50.

PARASASSI, Maurizio, and RUFFOLO, Giorgio. *La disoccupazione in Italia.* Relazione sintetica delle indagini e degli studi promossi dalla Commissione parlamentare d'inchiesta sulla disoccupazione. With a preface by Roberto TREMELLONI. Bologna, Nicola Zanichelli, 1954. xxxiii+255 pp. 700 lire.

This work summarises the results of the inquiries and research carried out by the parliamentary committee set up to study the problem of unemployment in Italy. The preface is by Mr. Roberto Tremelloni, who was Chairman and the moving spirit of the Committee. Mr. Tremelloni contributed to the *International Labour Review* in 1953 an article summarising the results of the surveys made and the conclusions drawn by the Committee.[1]

Migration.

DAVISON, R. B. *Migrant Labour in the Gold Coast.* A Pilot Survey. Achimota, Gold Coast, Department of Economics, University College, 1954. 41 pp. 3s. 6d.

Migrant labour has been an important phenomenon in the Gold Coast for many years, but little has been known about its volume or composition. This is an account of a pilot survey undertaken by the author in conjunction with the Ministry of Trade and Labour, with a view to obtaining more comprehensive and accurate information regarding annual movements of population between the Gold Coast and adjacent French territories. An additional object was to obtain experience of sampling techniques for future surveys. For the whole of the month of March 1954 an interviewing team was stationed at one of the major ferries in the north of the country, where it questioned every passenger crossing northwards, i.e. leaving the country. Over 40,000 persons were questioned in this way with a view to obtaining information on : (1) the daily and weekly flow of travellers and the proportion that could be classified as wage earners ; (2) the characteristics of the wage earning group—age distribution, nationality, tribal affiliation ; (3) the conditions of the journey—mode of travel, point of joining mechanical transport, frequency and duration of migration, immediate destination ; (4) the employment that the migrant had held in the Gold Coast, in which district and in which industry, and whether or not he had been registered with the Ministry of Trade and Labour.

The results of the inquiry are presented in tabular form and are commented on by the author. He regards the results relating to age distribution

[1] Roberto TREMELLONI : "The Parliamentary Inquiry into Unemployment in Italy", Vol. LXVIII, No. 3, Sep. 1953.

and the duration and frequency of migration as unreliable, and suggests that any West African figures purporting to give age or other temporal analyses must be treated with great reserve. In other respects the inquiry provided enlightening and unexpected information. This is an interesting inquiry into a subject of great importance in Africa, which has not often received serious statistical study.

RAO, V. K. R. V. *An Economic Review of Refugee Rehabilitation in India.* Monograph No. 1 : *A Study of Nilokheri Township.* Delhi, School of Economics, University of Delhi, 1954. ii+56 pp. 2 rupees 8 annas.

— Monograph No. 3 : *A Study of Faridabad Township.* ii+76 pp. 3 rupees.

— Monograph No. 5 : *A Study of Kingsway Camp.* ii+70 pp. 2 rupees 8 annas.

— Monograph No. 6 : *A Study of Rajpura Township.* ii+78 pp. 2 rupees 8 annas.

— Monograph No. 7 : *A Study of Tripuri Township.* iv+68 pp. 2 rupees 8 annas.

This series of reports presents the results of a survey undertaken in 1952 by the Delhi School of Economics at the instigation of the Ministry of Relief and Rehabilitation in different refugee townships created by the Government of India for migrants from Pakistan at the time of the partition. Case histories were obtained for one-tenth of the households in these townships. Information was sought among other things about the educational characteristics of the individuals, their present occupation and income and their situation in 1946-47. Changes occurring over the period 1947-52 are reviewed with a view to determining whether the measures undertaken as part of the rehabilitation plan for the refugees have been successful.

Vocational Guidance and Training.

CIMATTI, Leone. *Verso la giusta strada.* Le basi dell'orientamento professionale. Rome, Arte Grafica Romana, 1955. 158 pp. 400 lire.

In an introductory section, the author lays down the principles of vocational guidance and stresses the diversity of the economic and social factors that must be borne in mind by those who give it. He then reviews the ages at which this guidance should be given. Next comes a model card containing all the information likely to be of value to the counsellor. Finally the author refers to the infinite variety of human aptitude and behaviour and calls attention to the conclusions that the counsellor may draw therefrom with a view to providing guidance in the choice of an occupation.

COMMISSION ON HUMAN RESOURCES AND ADVANCED TRAINING, United States. *America's Resources of Specialized Talent.* New York, Harper & Brothers, 1954. xviii+332 pp. $4.

DEGEN, Alois, and ROHLFING, Theodor. *Lehrlingsrecht.* Der Wirtschafts-Kommentator. Steuer-, Arbeits-, Sozial- und Wirtschaftsgesetze kommentiert für die Praxis. Part B: *Arbeits- und Sozialrecht.* Frankfurt-am-Main, Verlag Kommentator, 1954. iv+40 pp.+annexes.

СОНИН, М. Я. Подготовка квалифицированных рабочих на производстве. Moscow, Госполитиздат, 1954, 211 pp. 3.55 roubles.

The latest edition of M. Ya. Sonin's work on the training of skilled workers in the Soviet Union. The author is a vocational training instructor, and the book is intended for those who deal with the provision of skilled personnel for Soviet undertakings. The subject is well presented, and each of its essential stages receives treatment in turn : skill testing ; planning the training of new workers and of unskilled personnel already at work ; methods of training ; and administrative organisation.

Conditions of Work.

ISAAC, Jorge E. *Los estímulos del trabajo.* Santa Fe (Argentina), Librería y Editorial Castellví S.A., 1954. 185 pp.

MINISTRY OF LABOUR, LABOUR BUREAU, India. *Labour Conditions in the Building and Construction Industry in India.* Delhi, 1954. 63 pp.

SEITZ, Karl. *Die Persönlichkeit in ihrer betriebspsychologischen Bedeutung.* Basle, Verlag von Helbing & Lichtenhahn, 1954. 106 pp.

Rehabilitation.

WADIA, A. R. *The Handicapped Child.* Bombay, Tata Institute of Social Sciences, 1954. 171 pp. 4 rupees 8 annas.

A collection, in book form, of a number of articles on handicapped children published during the last few years in the Indian Journal of Social Work. There are chapters on mentally retarded, delinquent, deaf, blind, homeless, physically handicapped and hospitalised children.

This volume should be of use to those countries which, like India, are striving to improve the conditions of their handicapped children.

Social Security ; Public Health.

ASSOCIATION NATIONALE DES ASSISTANTES SOCIALES ET DES ASSISTANTS SOCIAUX. *Réalité du service social au carrefour des textes et des faits.* Paris, 1954. 150 pp.

BARASSI, Ludovico. *Previdenza sociale e lavoro subordinato.* Two volumes. Milan, Dott. Antonino Giuffrè, 1954. xii+965 pp.

BIBLIOTHÈQUE DU SERVICE NATIONAL D'HYGIÈNE ET D'ASSISTANCE PUBLIQUE. *Code d'hygiène, d'assistance publique et sociale.* Port-au-Prince, Haiti, Imprimerie de l'Etat, 1954. xiv+511 pp.

BIONDO, B. *La sicurezza sociale nel mondo.* Studio sui sistema di sicurezza sociale di 149 paesi. Preface by Ezio VIGORELLI. Trento, Ed. T.E.M.I., 1954. vii+661 pp. 2,500 lire (paper) ; 3,000 lire (linen).

This book, the first of its kind to appear in Italian, gives a broad picture of social security throughout the world, together with an interesting account of the development of the idea of social security and of its main features at the present time.

The first part of the book sets out to define social security and to describe its practical manifestations ; it goes on to outline the general trend by which social security has evolved out of compulsory social insurance and public assistance, and concludes with an account of the work of the international organisations in this field, particularly the I.L.O. The second part gives a comparative general account of each national scheme with reference to the classes of person affected, the contingencies covered and the distribution of the cost. The third part, which fills 364 pages, contains a methodical survey of the schemes in existence throughout the world, taking as a basis the information available in 1954 in respect of 149 countries. This account is extremely comprehensive ; for each country and each national scheme detailed information is given regarding the statutory basis, scope, financing, and the nature and extent of the benefits provided.

The appendix contains a very full bibliography of the specialised reviews published in each country and of the most important books dealing with social security questions.

This work, by its scope, wealth of detail and clarity, deserves to be recommended to all engaged in the study of social security questions or responsible for planning or administering social security schemes.

BORSI, Umberto, and PERGOLESI, Ferruccio (editors). *Trattato di diritto del lavoro*. Part IV : *Le assicurazioni sociali* (in two volumes). Padua, CEDAM, 1954. 446 and 371 pp. 4,500 lire the two.

This fourth part of a treatise on Italian industrial law comprises two volumes dealing with social insurance, in which a number of authors analyse the nature of Italian social insurance law and the legal characteristics of the various branches of social insurance. The authors and subjects dealt with are respectively : V. Gueli : social insurance law ; R. Richard : insurance against employment injuries and occupational diseases ; A. De Valles : sickness insurance and tuberculosis ; G. Roberti : old-age disability insurance; P. Gasparri : unemployment insurance ; C. M. Jaccarino : maternity insurance ; V. Carullo : family allowances and supplements to wages ; P. Corso : special provisions relating to certain categories of workers ; U. Prosperetti : assistance to workers.

FERGUSON, T., and MACPHAIL, A. N. *Hospital and Community*. Published for the Nuffield Provincial Hospital Trust. London, New York, Toronto, Geoffrey Cumberlege, Oxford University Press, 1954. ix+157 pp. 9s. 6d.

The growth of hospital care is briefly sketched, Scotland being taken as an example. The authors take a cross-section of the cases treated in hospital under present-day conditions and point out some directions in which the burden of hospital care is influenced by social and environmental conditions. Then follows a study of a group of 705 male patients who were treated in the general medical wards of four general hospitals in the west of Scotland in 1950-51. An account is given of the circumstances of their illnesses, the results of the treatment provided, and how these patients fared after they left hospital. This follow-up was conducted three months and again two years after the patients left hospital. The authors note the factors influencing the success of these men after they left hospital and include a short account of experiments in the placement of patients who left hospital with some residual disability calling for modification of occupation.

PARETTI, Orazio, and CERBELLA, Amleto. *Sintesi della previdenza sociale : Previdenza. Infortuni. Malattie*. Fifth edition. Naples, E. Pironti e Figli, 1954. 259 pp.+36 tables. 2,200 lire.

THEUERKAUF, E. *Mutterschutzgesetz*. Gesetz zum Schutze der erwerbstätigen Mutter (Mutterschutzgesetz) vom 24. Januar 1952. Das Neue Recht, Nr. 3. Cologne-Deutz, Bund-Verlag G.m.b.H., 1954. 206 pp.

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" The Lowering of Production Costs and the Increased Prosperity of the Soviet People ", by V. P. Alexandrova.

DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE, United States. *Food Consumption of Urban Families in the United States. . . . With an Appraisal of Methods of Analysis*. By Faith CLARK, Janet MURRAY and others. Agriculture Information Bulletin No. 132, October 1954. Washington, 1954. vi+203 pp. $1.

This study presents the results of 1,588 interviews conducted in the spring of 1948 with a country-wide sample of households and similar seasonal surveys made in five principal cities at different dates between 1948 and 1949. It includes statistics of the kinds of food used in a given week, expenditure on different foodstuffs, and consumption of home-produced food. The households are classified by family income, family size, and a number of

other characteristics. Statistical measures are developed for the analysis of the variation in consumption for families of different characteristics, and for estimating the relationship between consumption and income. Comparisons are presented with food consumption in 1942. The study ends with a detailed appraisal of sampling reliability, collection procedure and consistency of results. Sample forms used in the survey are appended.

MINISTRY OF INDUSTRIES, HOUSING AND SOCIAL SERVICES, Ceylon. *Housing Policy of the Ministry of Housing.* Colombo, 1954. 55 pp. 1 rupee.

Огурцов, С. Под'ём благосостояния трудящихся в европейских странах народной демократии. Moscow, Госполитиздат, 1954. 120 pp. 1.45 roubles.

This short but interesting volume, entitled " The Advance in Workers' Welfare in the People's Democracies ", describes some of the changes in central and south-eastern Europe since the war. The author, S. Ogurtsov, stresses in particular that in these countries (Albania, Bulgaria, Czechoslovakia, Hungary, Poland and Rumania) socialist development has abolished unemployment and destitution and that the disappearance of these evils, together with fundamental changes in labour relations and conditions of work, have brought about a constant rise in national income and in levels of consumption. There is also reference to the improvement in housing and the great cultural developments in these countries.

PAN-AMERICAN UNION. *Problems of Housing of Social Interest.* Washington, 1954. 232 pp. $1.

This report presents a broad analysis of the social and economic factors that have produced the housing problem in Latin America. It also contains a discussion of the house-building industry and some information on methods of financing. Texts of resolutions on housing adopted by the *Ad Hoc* Committee for the Study of Low Cost Housing and by the Inter-American Economic and Social Council are also included.

UNION INTERNATIONALE DES ORGANISMES FAMILIAUX. *Modalités sociales et familiales des règles d'attribution des logements locatifs construits par la collectivité ou avec son aide (Milan, 1954).* Brussels, U.I.O.F., Commission du logement, 1954. 107 pp. 40 Belgian francs ; 350 French francs ; 3.50 Swiss francs ; 6s. 6d.

The question of what constitutes an equitable basis for the allocation of housing is one of the most delicate political problems in the realm of housing policy. The International Union of Family Organisations has performed a notable service in publishing extracts from laws and regulations in five countries—Italy, France, United Kingdom, the Netherlands, United States—dealing with the criteria for allocating public housing among applicants.

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" Raising Productivity—The Most Important Problem in Socialist Agriculture ", by N. Karotamm.

LECORDIER, Gaston. *Le monde rural en marche.* Panorama sociologique. Saint-Etienne, Editions I.G.C., 1954. 338 pp. 460 francs.

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This work by A. I. Nedorezov on agrarian changes in Czechoslovakia since the foundation of the Republic is a contribution to the study of modern land relationships. The author points out that before the Second World War most Czechoslovak peasants had little or no land, and their attempts to acquire land led only to inadequate reforms. The People's Government has solved the agrarian problem in the interests of the rural working class, so that the land now belongs to those who cultivate it—with valuable help from the State.

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GREER, Paul. *Co-operatives. The British Achievement.* Foreword by Lord WILLIAMS. Introduction by Marquis W. CHILDS. New York, Harper & Brothers, 1955. xiv+171 pp. $3.

MINISTRY OF RAILWAYS, RAILWAY BOARD, India. *Consumer Co-operative Movement on Indian Railways.* Report by J. K. VERMA. New Delhi, 1954. vi+192 pp.

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